READY REFERENCE

FENCE GUIDE

PUBLISHED BY

PITTSBURGH STEEL COMPANY

PITTSBURGH · · PENNSYLVANIA

MAKERS OF PITTSBURGH FENCES SINCE 1901

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PITTSBURGH STEEL COMPANY
PITTSBURGH, PENNA.

BOOKLET No. 409
8th Printing—October, 1937

ACKNOWLEDGMENT

In the compilation of the information for Fence Guide Charts contained in this work the aid and counsel of the following farm authorities are gratefully acknowledged:

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State College, Pa.

J. B. DAVIDSON,
Iowa State College of Agriculture,
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R. C. MILLER,
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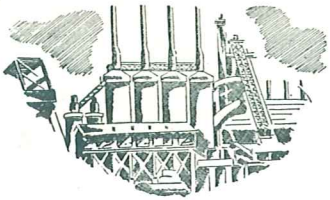
INTRODUCTION

THE importance of effective enclosures for barnyards, orchards, corn fields, pastures, lawns and many other types of property units has long been recognized by educational authorities and progressive farmers alike. The primary purpose of this Book is to provide in convenient, ready reference form a practical guide for the selection of suitable styles of fence for these many varying enclosure requirements. In addition to the Fence Guide Charts to serve this purpose a number of other features have been included in the Book as a means of broadening its scope of permanent usefulness for fence buyers, fence merchants and all others who are interested in better fencing and better farming practice.

PITTSBURGH STEEL COMPANY

PART ONE

THE MANUFACTURE OF IRON, STEEL, WIRE AND FENCE

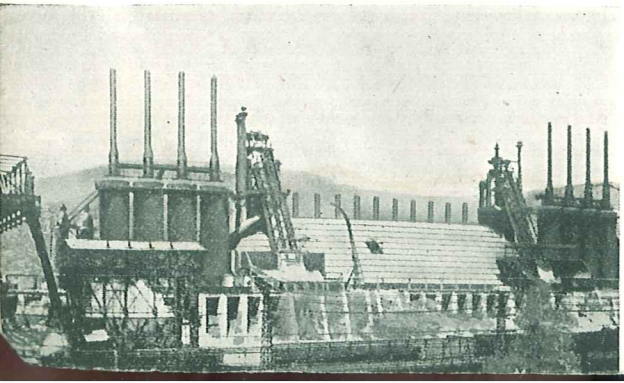


MAKING IRON in the BLAST FURNACE

THE manufacture of iron and steel provides so much of spectacular interest to the layman that much has been written about it in almost every sort of general publication, ranging from the fictional to the seriously scientific. Even so, however, the average man, having had no occasion to study steel production at close range, has but little idea of the multitude of detailed factors in everyday iron and steel making that can either increase or lessen final quality in the finished steel product. In this respect steel manufacture has much in common with "crop manufacture," or farming. To the experienced steel man there may be as much difference in quality between steels as there is difference to the experienced farmer between soils. Happily, however, it is possible—by benefit of vast specialized experience, ample resources and continuous, thorough care—largely to govern steel quality. Thus the careful steelmaker has infinitely more control over his product than even the most modern farmer ever has over his.

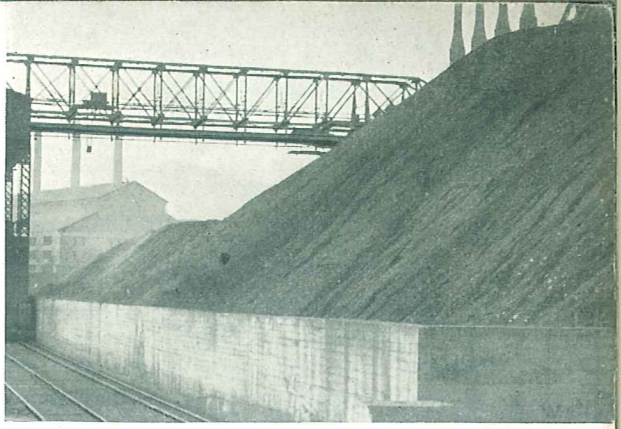
The first step in steel manufacture is the production of pig iron—that is, after the iron ore, coke, limestone and all other necessary ingredients have been produced and assembled.*

**It takes about 6 tons of ingredients to make 1 ton of steel. This means that the Steel Industry is a very heavy supporter of many related industries in many sections of the Country. Ore, for instance, comes from Michigan and Minnesota. From there its transportation to the blast furnaces provides employment for thousands. Limestone is quarried chiefly in Pennsylvania, Ohio and Maryland. Mining and transportation of millions of tons of coal for steel-making coke provide large additional employment—all before the blast furnaces can turn out a single ton of iron. In addition, actual steel manufacture and the handling of finished steel products require, directly and indirectly, the employment of an almost incalculable number of materials and men in every state of the Union. The peculiar requirements of quality steel manufacture render this Industry so non-adaptable to ordinary straight-line mass production methods that it probably supports a larger proportion of the population than any of the highly mechanized industries. In this respect, too, Steel and Farming have much in common.*

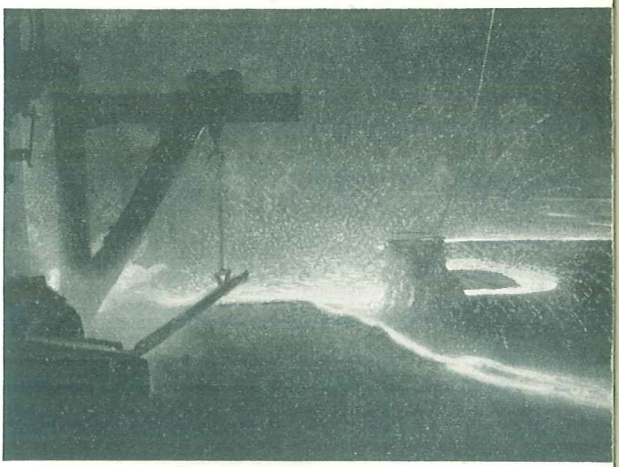


Pittsburgh Steel Company's blast furnaces at Monessen, Pennsylvania Works

Pig iron is made in the blast furnace — a 90-to-100-foot high furnace which takes measured charges of ore, coke (for fuel) and limestone (to separate the impurities from the iron) and literally melts them down under the terrific heat of an oxygen-fed forced-blast fire. Wastes and impurities (earthy matter from the ore, limestone and ash) combine under this intense heat to form a slag, purifying the molten iron. This slag eventually separates itself from the iron, much as cream separates itself from milk, and is drawn out of the furnace periodically. The remaining pure molten metal is then tapped out at the bottom of the furnace and run off into mammoth fire-brick-lined "ladles" for further handling.



The ore yard at Monessen Works. Over a quarter-million tons of ore can be stored here.

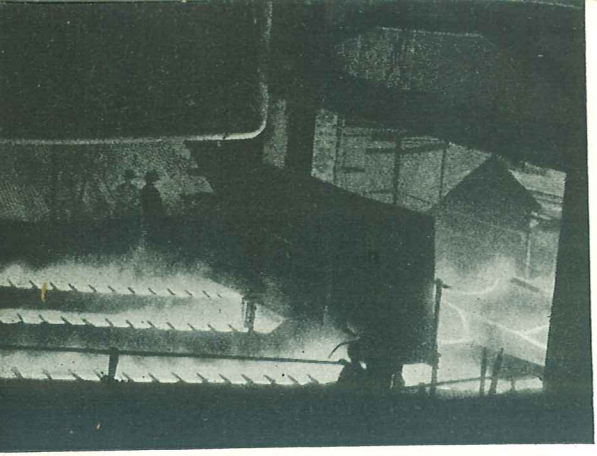


Tapping a blast furnace. The stream to the right is slag. The whiter stream is iron going to the ladles.

From the time the ingredients are introduced at the top of the blast furnace to the time the iron is tapped out at the bottom usually about 12 hours have elapsed.

If the iron in the ladles from the blast furnace is to be converted immediately into steel it is transported by crane and rail cars, still in its molten state, and poured into a "hot metal mixer," or reservoir, where heat is applied to keep it molten for introduction as occasion demands into one or another of the steelmaking furnaces later to be described.

If the iron is not for immediate use, however, it is cast from the ladle into small rectangular molds, where it is hardened into blocks for easy handling or storage. These blocks, each roughly 24″ long x 10″ wide and weighing on the average about 135 pounds, are called "pigs." Hence the name "pig iron." These pigs are later remelted as required for the steelmaking furnaces.



Casting iron pigs. The streams of metal at the right are flowing direct from the ladle.

The iron-making capacity of such a producer as Pittsburgh Steel Company, operating two blast furnaces and controlling sufficient ore and coke for all its needs, is about 1200 tons each 24-hour day.

REFINING IRON

The next step in the making of steel is refinement of pig iron, which in its crude state is unsuitable for fence use because it contains many impurities and an excess of such substances as carbon, silicon, manganese, phosphorus and sulphur. Also it lacks the toughness, ductility and tensile strength that come from the repeated rolling and working necessary to produce finished steel products.

In American steelmaking practice there are two chief ways of converting iron into steel for fence. The first of these is the Acid Bessemer* process, which consists principally of blowing air under pressure through a large "converter" filled with 5 to 25 tons of molten iron. This process oxidizes iron and such other ingredients as manganese and silicon, which combine with the oxygen in the air and form slag, the carbon going off as a gas. These reactions create in themselves enough heat to keep the metal molten without extraneous firing.

When most of the impurities have been thus removed the remaining molten metal is *Acid Bessemer Steel* to which various other ingredients may now be added to produce whatever analysis of steel may be desired for the particular purpose or product in prospect.

For reasons which will be seen later, Pittsburgh Steel Company uses no Bessemer converters, making all its steel by the *Basic Open Hearth* method.

BASIC OPEN HEARTH STEEL

The open hearth furnace is a huge rectangular "bowl" of 100-odd tons metal capacity, completely enclosed by thick walls of highly heat-resistant refractory brick.

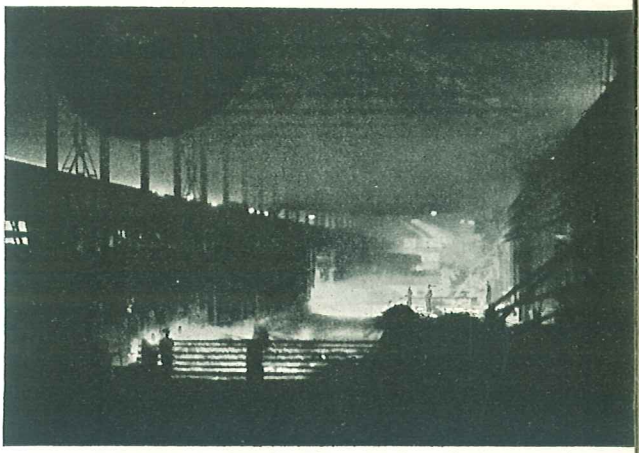
In making steel the preheated, dolomite-lined bottom of this furnace is first covered with about 21,000 pounds of extremely pure

** Acid steel is steel which has been refined by oxidation. This removes only carbon, silicon and manganese from the iron. Basic steel is steel which has been purified by oxidation plus the addition of a strong base—usually lime—to remove also the phosphorus and some of the sulphur. Although either basic or acid steel can be produced both by Bessemer and Open Hearth processes, the composition of the ores available in the United States causes most American steels to be produced either by the Acid Bessemer or by the Basic Open Hearth process.*

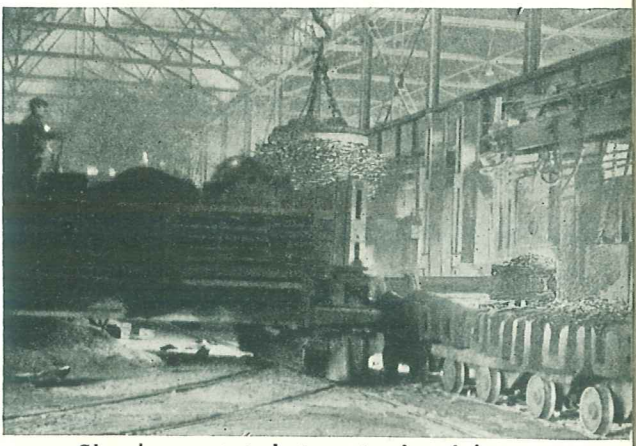
limestone (to separate sulphur and surplus phosphorus — which causes slight brittleness — from the pig iron to be introduced later). Meanwhile flaming clouds of preheated gas mixed with preheated air are being introduced alternately from each end of the furnace to create a temperature of something over 3000° F.

Now comes the introduction into the furnace — called "charging" — of a fixed amount of selected scrap steel, which will be remelted and fused with the iron to be poured in later. This method of using scrap steel not only keeps steel prices low through the prevention of waste, but happily adds much to the quality of the new steel as well.

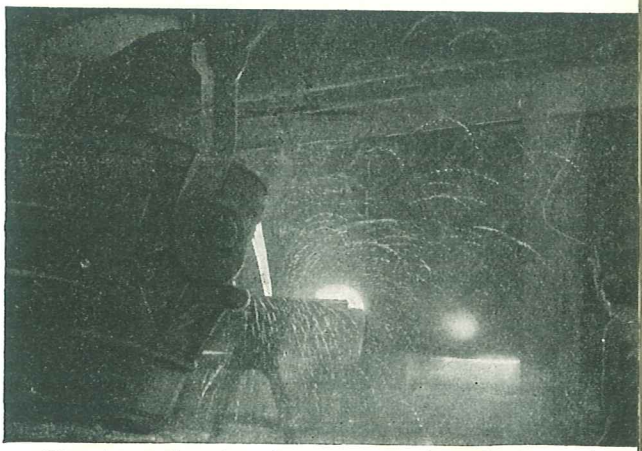
The required amount of scrap for a given batch or "heat" of steel having been charged into the furnace, the gas flames are now turned on full. After about two hours of this intense heat the scrap is melted down to a thick liquid, ready for admixture with hot iron from the blast furnace. This molten iron — about 50 tons of it at a time — is charged from a ladle through doors at the



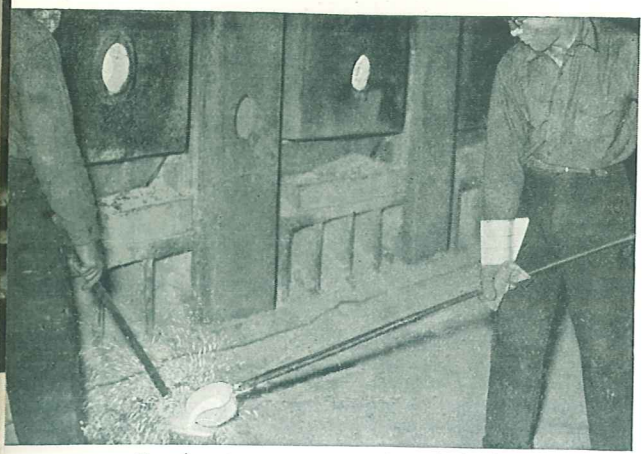
The open hearth charging floor. This building, housing 12 open hearth furnaces, is 1200 feet long.



Charging scrap steel at an open hearth furnace.



Charging molten iron from the ladle into the front of an open hearth furnace.



Pouring test at an open hearth during the "working" period.

front of the open hearth furnace. A refractory trough is inserted at the door and the ladle of hot metal is brought into pouring position by electric crane. Flowing from ladle to trough and thence into the furnace, the iron falls to the furnace bed where it mixes with the partly melted steel already there.

Charging completed, the mass of metal inside the furnace now seethes and bubbles in terrific activity for several hours until the "lime boil" period is over. During this "lime boil" period the limestone from the bottom of the furnace, calcined (semi-powdered) by the heat, moves slowly upward through and to the surface of the molten metal, purifying as it goes. When this action is over—that is, when the calcined lime has reached the top—impurities from the iron have combined with it to form slag, which floats and bubbles over the whole surface of the molten metal in the furnace.

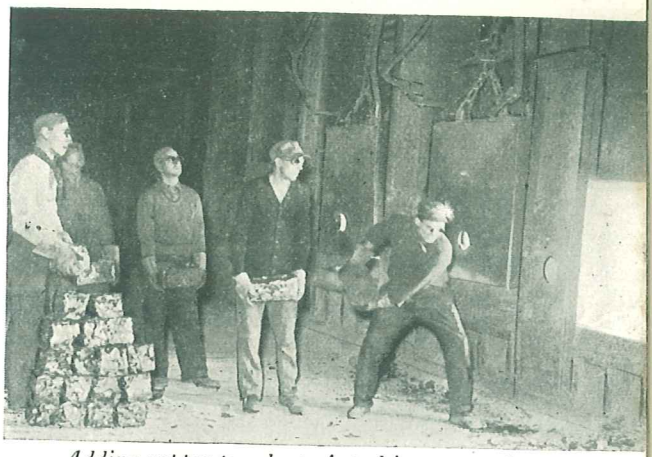
Now comes the "working period," during which greatest skill and experience are necessary to keep the temperatures just right in the furnace and to control all the other factors in accordance with the requirements of each individual heat of steel. Throughout this period test "spoonfuls" of the metal are taken from the furnace through special openings in the water-cooled doors. These test samples are cast in small rectangular molds, quickly cooled, then fractured and examined carefully by men of long experience who can read them almost as you would read a book. In addition to this expert examination, which gives the cue for any necessary quick action to be taken at the furnace, the samples are analyzed at once in the mill's chemical laboratory. Findings of the laboratory are immediately transmitted by telautograph to the Head Melter, who, together with his first and second assistants, makes whatever regulations or additions to the "heat" circumstances may require.

At suitable times during the "working period" required charges of copper (see Page 52) and manganese are added to insure qualities of rust-resistance and tough strength in the finished fence later to be made from this steel.

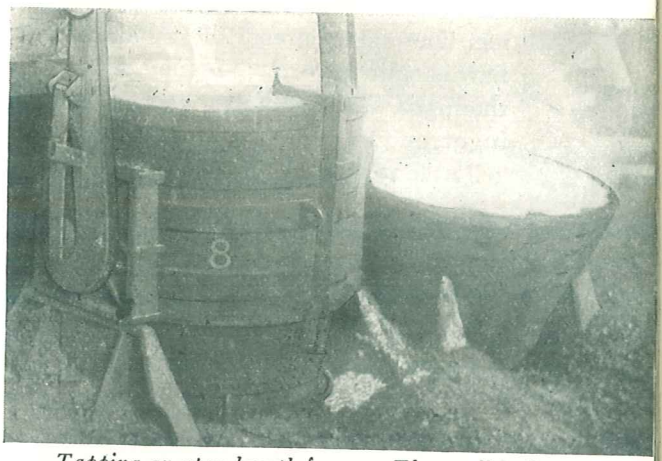
From the time of charging the limestone to the time the finished steel is ready to tap out of the open hearth usually about eleven

hours have elapsed.

Open hearth steel, as you can readily understand even from these extremely short descriptions of the two processes, is a good deal more expensive to make than Bessemer steel. It takes more time and requires more preparation and equipment, but its advantages of quality well outweigh its disadvantages of production where it is to be used in such materials as wire and fence, whose steel must be highly uniform if the finished products are to give real service. Even *basic* Bessemer steel will retain a large percentage of phosphides and sulphides from the iron. This may be harmful from the standpoint of use for fence. Further, the speed of the Bessemer process does not permit the accurate control made possible by the slow Open Hearth process. Bessemer steel is quite suitable for many purposes, but it is not generally considered the best steel for fence use.



Adding copper to a heat of steel in an open hearth furnace.

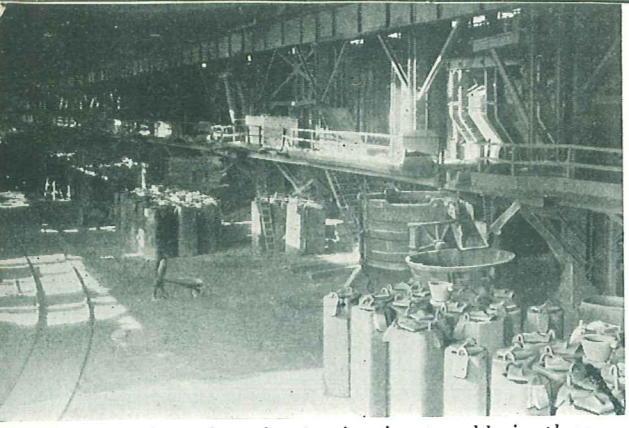


Tapping an open hearth furnace. The small ladle or "thimble" is for the slag overflow.

Pittsburgh Steel Company operates 12 open hearth furnaces with a total capacity of about 2,000 tons of high quality basic open hearth steel each 24-hour day—for Pittsburgh Fences, Pittsburgh Wire Products and Pittsburgh Seamless Steel Pipe and Tubes.

POURING INGOTS

When molten steel is tapped from the open hearth furnace it is received in a large fire-brick lined ladle, somewhat similar to that into which iron is poured at the blast furnaces. As a means of getting this great mass of molten metal into a more easily handled solid form it is immediately cast into individual "ingot" molds.



Open hearth casting pit, showing ingot molds in place for casting.

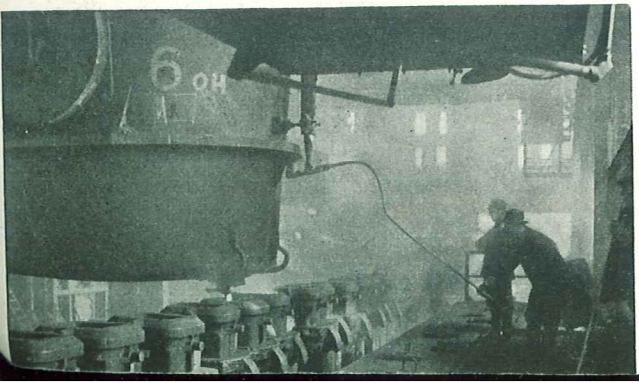
These molds are large, hollow iron forms about 22 inches by 24 inches in girth and a little over 6 feet high. Each mold will cast a 3½-ton steel ingot.

In pouring ingots we again have a choice of methods. The old familiar method is known as "top - pouring" or "top-casting." This merely means that the molten steel is poured into the ingot molds at their tops, just as you would fill a glass of water from a spigot. To further the parallel, imagine this glass of water to be frozen. There would be a contraction void in the center. You have seen this in blocks of ice. The same effect follows ordinary top-casting of an ingot. The flaw is called a "pipe." It may extend for a considerable distance into the ingot. Its effect is to weaken the blooms or billets rolled from the ingot, and to intensify probability of serious defects in finished wire.

Pittsburgh Steel Company uses two methods of pouring ingots, each of which is more expensive and more difficult than the ordinary way of "top casting," but both of which are designed specifically to avoid "piping." The first of these is the "hot top" method. A hot top is an auxiliary brick mold fitted to the ingot mold. It is designed to hold the heat from the pour and thus prevent too rapid solidification of the molten steel. As the "pipe" begins to appear in the cooling ingot under the hot top, the molden metal in the hot top reservoir flows down and forestalls the action. In other words, the "pipe" is transferred to the hot top, which is then discarded.

The second method of pouring ingots to avoid piping is the "bottom cast" method. "Bottom-pouring" or "bottom-casting" means literally that the ingot mold is filled from the bottom up with molten steel from the ladle. This is accomplished by means of a network of fire-clay piping leading out from a central "riser" at each bottom-casting station on the pouring floor. Each length of this piping network runs underground from the bottom of the

Casting hot top ingots. Note the stream of metal flowing from the ladle valve.



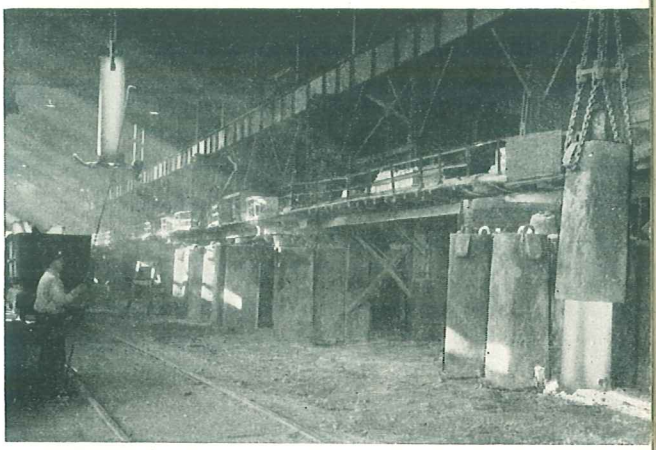
central riser to a position underneath an ingot mold. There are fifteen preheated ingot molds in the group around each pouring station; thus there are fifteen individual lengths of piping in each network. In bottom-pouring, the ladle of hot steel is suspended by crane immediately over the funnel-shaped top of the riser. As the stream of molten metal leaves the small tap-hole in the bottom of the ladle it is carefully fed into the riser, whence it flows down into the piping network, then out and very slowly up from the bottom into every mold simultaneously.

Depending upon the specific use to which the steel is to be put, Pittsburgh Steel Company either bottom casts or uses the hot top for all ingots for fence and seamless tubes. All manufacturers do not do this, perhaps because of the considerable extra expense involved. It is well to inquire on this point when you go to buy fence. Its importance is considerable.

ROLLING STEEL

Omitting many details, but covering some of the most important essential factors in production of uniformly high grade steel, we have now come very briefly to the point where steel is in the form of ingots, from which the molds are removed ("stripped") as soon as the metal solidifies enough to retain its ingot shape.

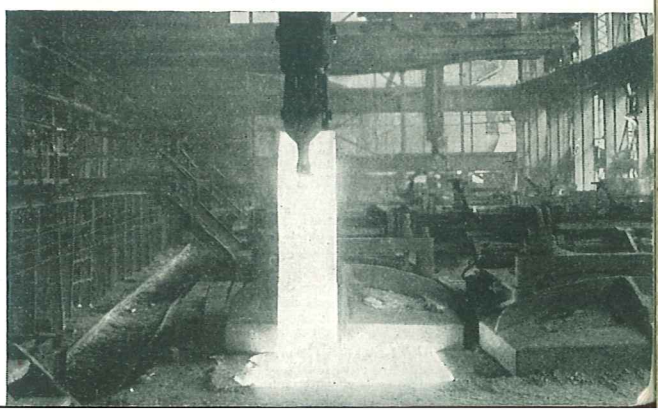
After this stripping the ingots are loaded in a rail car, still red hot, and conveyed to the building which houses the blooming mill—first step in the reduction of ingots by successive hot r o l l i n g processes to smaller proportions for use in making finished products



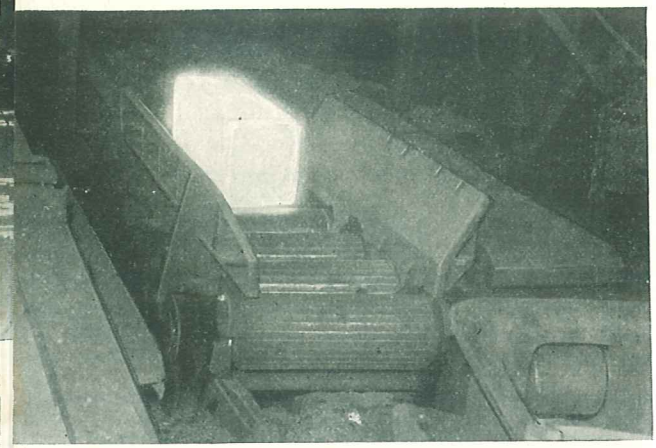
Stripping the molds from ingots. Note the car of hot ingots in the background.

Soaking Ingots:

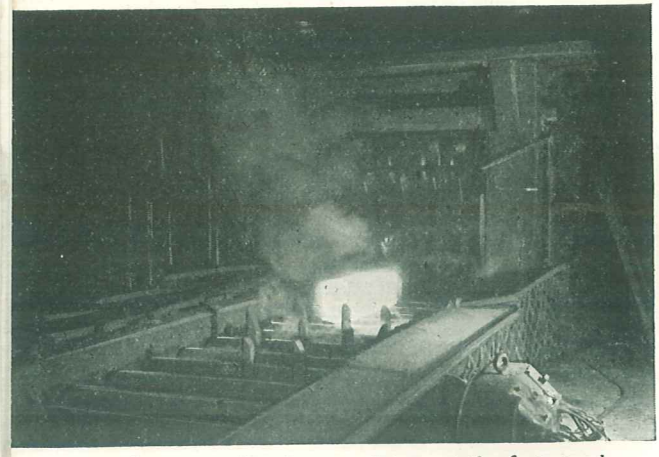
Before an ingot can be successfully r o l l e d, its interior and exterior temperatures must be ap-



Lifting an ingot from one of the soaking pits just before rolling in the blooming mill.



Hot ingot on the conveyor to the blooming mill. A special ingot car is seen in the foreground.



An ingot entering the second pass at the first stand of the blooming mill.

proximately the same overall, for temperature inequalities in the ingot would cause trouble in rolling, with consequent imperfections in the finished steel. Each ingot is therefore taken immediately after stripping to the "soaking pits." These soaking pits, located in the same building with the blooming mill, are comparatively small gas-fired pit furnaces, each accommodating about 20 tons of ingots. Here the ingots, standing on end, are allowed to "soak" in heat of about 2000° F., until they reach that temperature uniformly. They are then ready for rolling.*

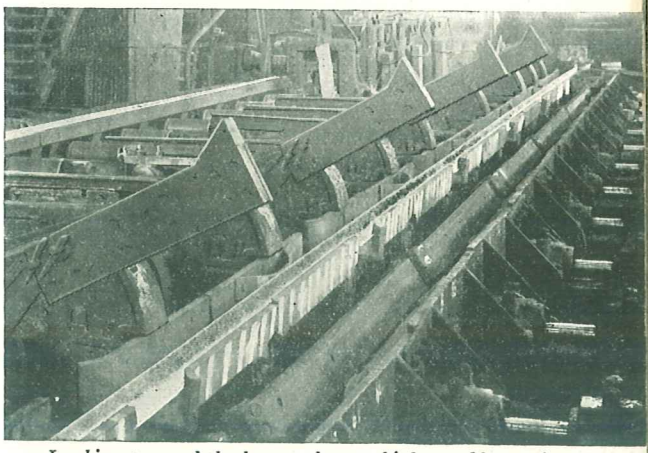
Blooming: From the soaking pits we now see an ingot brought out, glowing hot, and laid on a power-driven roller-table conveyor which carries it immediately to the first stand—or section—of the "blooming" mill. This "three-high" mill may be described as a series of openings, or "passes," set in three rows, row over row. Each pass is open at both front and rear of the mill, and each is successively smaller than its preceding neighbor in the stand. As the hot ingot reaches the mill it is forced into the first and largest of the passes, where it is seized between heavy revolving rolls and drawn through the pass amid a great shower of sparks and red hot scale. Since the space between the rolls is a bit smaller than the actual thickness of the ingot itself, this rolling "squeezes" down the

* *Hot rolling causes certain changes in the molecular structure of steel, imparting toughness and tensile strength to the material. In a general way it may be said that the more steel is rolled the tougher it becomes, for each successive rolling compresses it more firmly. The effect is somewhat similar to that of a forging operation, although not so pronounced. Knowing this we find it easier to understand why short cuts in the manufacture of quality steel products are less practical in actual fact than in theory. Steel must be worked properly if the products made from it are to give real service.*

cross-section size of the block of metal, increasing its length in proportion.

Having gone through the first pass, the ingot is now turned by intricate machinery at the other side of the mill and guided back through the next, smaller pass. At the front of the mill now, it is again turned and sent back through the third pass; and so on, back and forth for at least nine consecutive passes until the ingot has been reduced to a "bloom" about 7⅝ inches square by 40 feet long.

Looking from the third stand of the blooming mill down toward the soaking pits. Note the hot bloom.



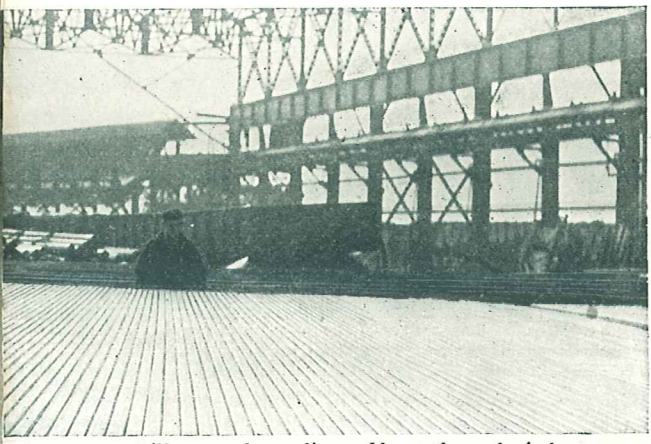
Looking toward the heavy shear which cuts blooms into shorter lengths for the billet mill in the left background.

This bloom, once its two rough ends have been cropped off and discarded, is now ready for further reduction by still more rolling, this time in a "two-stand three-high"* mill which performs practically the same function we have already seen begun at the first mill, and in practically the same way. Here, in six more passes, the bloom is reduced to about 4″ square in cross-section. Meanwhile the length has increased to about 135 feet.

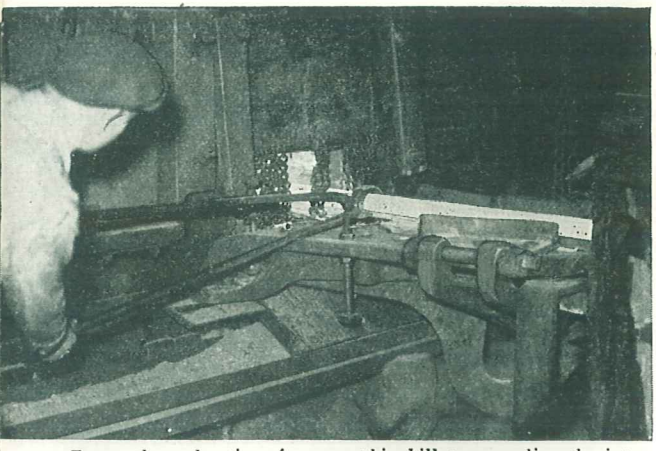
This 4″ bloom is now transferred to the "six-stand continuous" billet mill, which by the same sort of rolling already described further reduces the cross-section of the steel in six more passes to 1¾″ or "billet" size.

As the rolled steel emerges from the last stand of the billet mill (still red hot, although floods of cooling water for the rolls have been pouring over it since it first entered the blooming mill as an ingot), flying shears cut it into 30-foot lengths, each weighing about 300 pounds. These finished billets now go to the big outdoor cooling "table" for cooling and inspection, to be followed by further rolling in the rod mills.

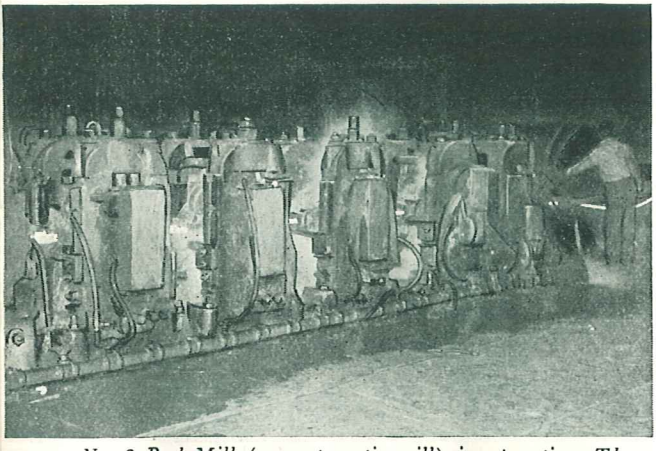
** Here, as elsewhere in this Book, we use Pittsburgh Steel Company practice as the basis for description. This does not mean that all mills necessarily use the same methods and the same types of equipment, although basically the sequence and general character of operations is the same.*



Billets on the cooling table at the end of the billet mill.



From the reheating furnace this billet goes directly into the first stand of the rod mill.



No. 2 Rod Mill (an automatic mill) in operation. The rolls in the foreground are the "roughing" rolls.

ROLLING RODS

Cooled, now, and provided it has successfully passed all inspection,* our billet enters the next step in the manufacture of wire and fence — further hot rolling, this time in the rod mill.

The length of billets used for rods depends upon the length of rod that is wanted, as a general rule the longer lengths being more desirable because they will produce longer unbroken coils of wire. A billet 1¾" square in cross-section and 30 feet long will come out of the rod mill as about a 2350-foot length of No. 5 (.207" diameter) round rod, which eventually will draw down to about a 5000-foot length of No. 9 gauge wire.

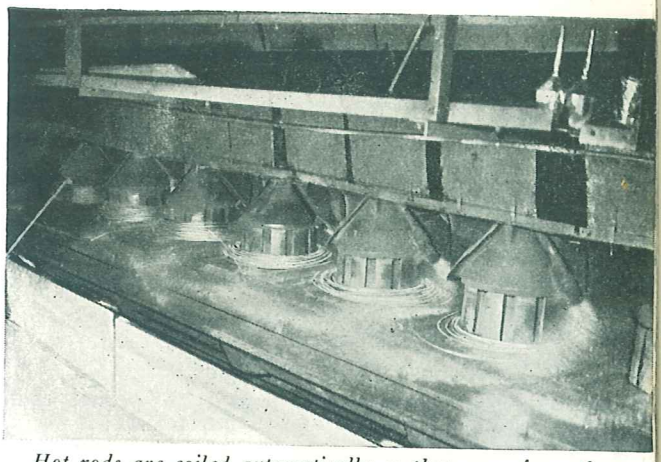
Before a billet can be successfully rolled into a round rod it must be reheated. Also, because a small hot billet will not retain its heat so long nor so well as the larger blooms and ingots, it must be handled quickly if premature cooling is to be prevented. Necessary reheating, therefore, is done in gas-fired furnaces

**For more detailed information about inspection, please see Part 3.*

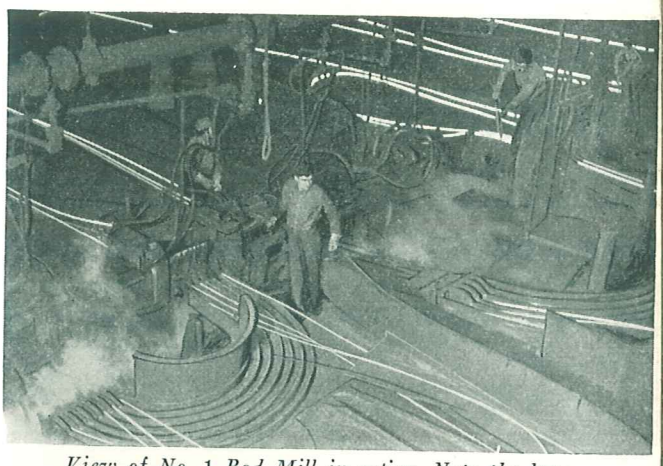
located as near to the rod mills as possible. We now watch a red-hot billet as it comes from one of these reheating furnaces, ready to be rolled down to rod size.

The first stand of the rod mill being only a very short distance from the mouth of the reheating furnace, the forward end of the hot billet passes immediately from the furnace into the first stand of rolls. Here, as the steel is drawn through, it is reduced in section, roughly rounded and passed on to the next stand, which still further reduces its diameter and increases its length. As it emerges from these "roughing" rolls its uneven end is sheared off, after which the rod enters the finishing rolls, eventually emerging as finished rod after a total of 16 passes. This rod is now coiled and allowed to cool before further inspection, testing and processing.

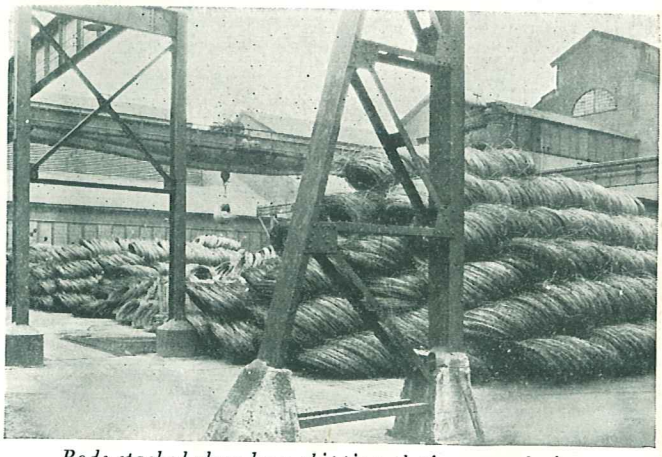
It is hard to describe adequately the scene this operation of hot rolling rods presents to the eye. Imagine a great long red-hot snake flying through the rolling mill at speeds up to 40 miles an hour and you will get a fair idea of it. It is a wonder-



Hot rods are coiled automatically as they come from the rod mill.



View of No. 1 Rod Mill in action. Note the long lengths of hot rods.



Rods stacked close by a shipping platform, ready for bundling and loading.

Bundling rods and loading for shipment. These particular rods are for one of the Country's leading chain makers.

ful thing to watch, but a most delicate process to perform properly, for almost innumerable problems are involved. An interesting single example is the matter of maintaining constant and exact speed relation between rolls, each of which must be driven a bit faster than the preceding one in order to take up slack caused by the diminished diameter and increased length of the passing steel. Constant vigilance is required to avoid the possibly disastrous results of failure to keep these roll speeds in proper relation.

Pittsburgh Steel Company operates two rod mills having a total capacity of 50 tons (about 780,000 feet) of No. 5 rod per hour. Much of the output of these mills goes to make Pittsburgh Fences, Pittsburgh Barbed Wire, Pittsburgh Nails, Pittsburgh Reinforcing and other Pittsburgh Steel and Wire Products. Much of it also goes to the automobile industry for such products as springs, shock-resistant steering wheels and control rods, and to manufacturers of high quality springs, bolts, rivets, nails, chains and hundreds of other wire products whose makers do not have their own facilities for making iron and steel. Samples from *every coil* of these rods, as of those for our own use, are inspected and tested before the rods are shipped.

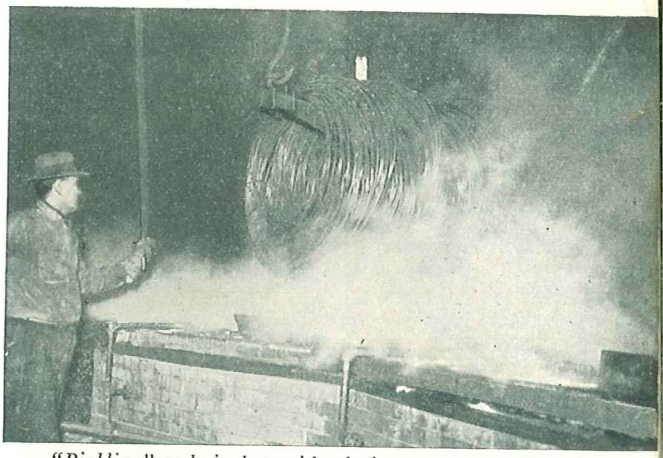
Preparing rods for drawing: Rods are reduced to standard wire gauge sizes by cold drawing through dies instead of by hot rolling, which for many reasons is impracticable for such small sizes of steel. Before a coil of rod can be cold drawn satisfactorily down to wire size, however, it must be subjected to several preparatory treatments. The first of these, after inspection and testing, is a thorough cleaning in hot acid solution to remove any mill scale the heating and hot rolling have caused to form. This operation, performed by immersing the coil in a vat of the acid solution, is called "pickling." Pickling is followed by a thorough rinsing with fresh water, after which the coil is lowered into a vat of hot milk of lime. The lime in this bath adheres to the surface of the rod, serving as an aid to the lubricant which will later be applied as the rod is actually drawn through the die. This lime treatment also tends to neutralize any acid which may remain after the pickling process.

The rod is now baked for several hours in a large oven to dry the lime coat thoroughly, after which the pickled, rinsed, lime-coated and baked rod is taken to the wire drawing department.

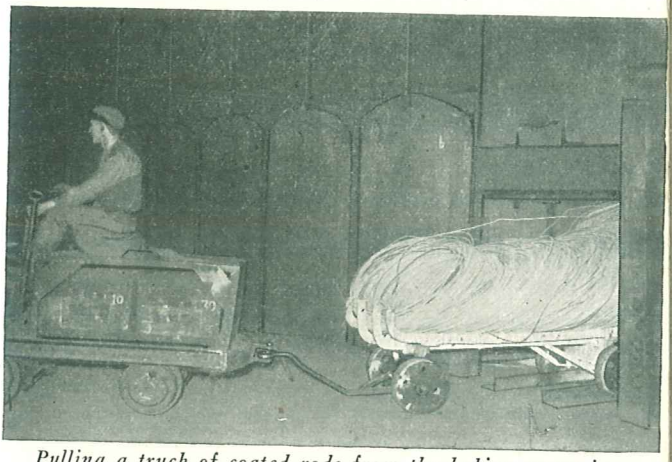
DRAWING WIRE

The visitor in the wire-drawing department sees a vast array of long "tables," each table equipped with several "drawing frames." Every drawing frame is served by a coil of prepared rod mounted on an upright drum. In the drawing operation now to be described the rod is slowly fed from this drum to the drawing frame, where it is reduced to wire size by means of being "squeezed" through an opening in a die.

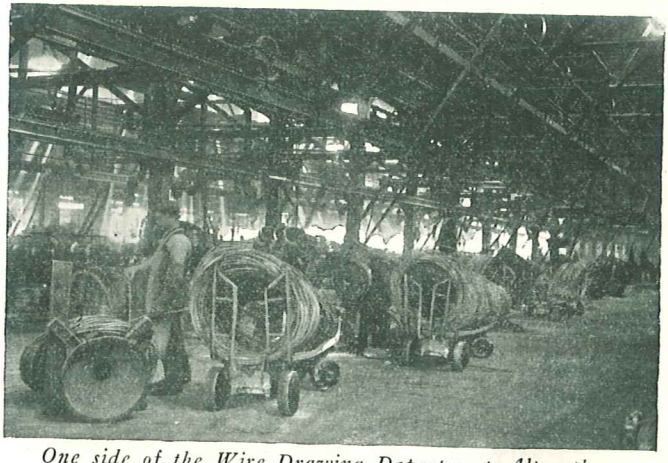
The die is the main feature of the drawing frame. It is, in effect, a thick block of hard steel through which has been sunk a hole corresponding in diameter at the outlet side to whatever gauge of wire is to be drawn. This hole is tapered—from large at the inlet side to small at the outlet side. This tapered or conical shape eases



"Pickling" rods in hot acid solution to remove all scale and foreign substance.

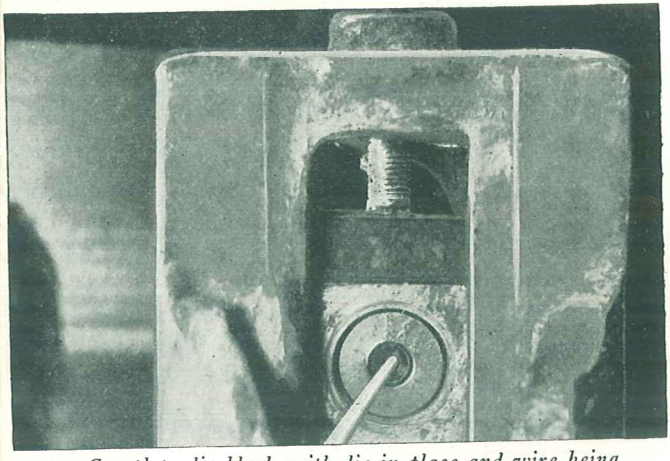


Pulling a truck of coated rods from the baking ovens in the Wire Drawing Department.



One side of the Wire Drawing Department. Altogether there are 337 drawing blocks in this Department.

Trucking baked, lime coated rods to the drawing frames in the wire mill.



Complete die block, with die in place and wire being drawn through the die.

the drawing process by making the reduction of the rod as gradual as possible.

In certain circumstances, when fine gauge wires are to be drawn, dies are inset (for hardness) with diamonds through which the required sizes of holes have been laboriously drilled. The dies for drawing ordinary fence sizes of wire, however, are made of hard alloy steel.

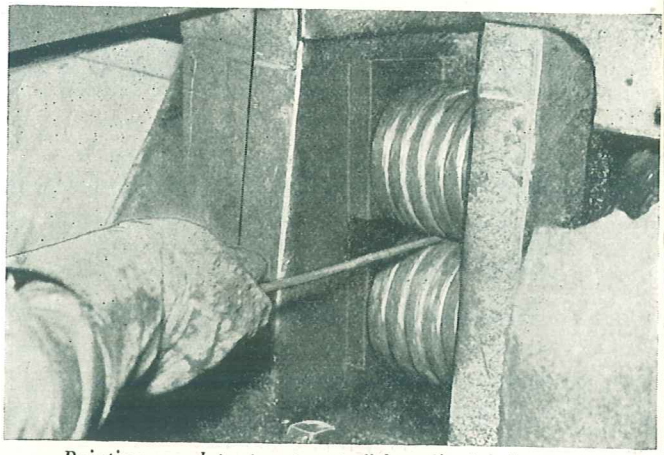
Close beside the die on the drawing frame is a power drawbar to grip the end of the rod as it is threaded through the die. Also close by is a power-driven block, or reel, to take hold of the wire, pull it and coil it after the first few feet have been drawn through the die by the drawbar.

Standing by the operator of one of these drawing frames we now watch the wire drawing begin as a coil of baked, lime-coated rod is brought in and set down over the drum which serves the particular frame we are watching. The operator first takes the end of the rod and puts a point on it with a machine he has close by for this purpose. This point enables him to start the rod through the die hole, which is of course smaller than the rod to be drawn. The point of the rod having been threaded through the die from the inlet side to the outlet side, the operator now attaches the power drawbar to it at the outlet side and connects the gear which starts the drawbar pulling. Slowly the rod begins to squeeze through the die, the effect being much as if you should try to force your finger into a ring too small for it. In such case, given enough power, either your finger would be squeezed down to size or the ring would distort. In drawing wire, the ring—or die—holds fast; therefore the only alternative is that the rod is

forcibly squeezed down to size, emerging at the outlet side of the die both longer and thinner, and shiny bright from the polishing action of the friction.

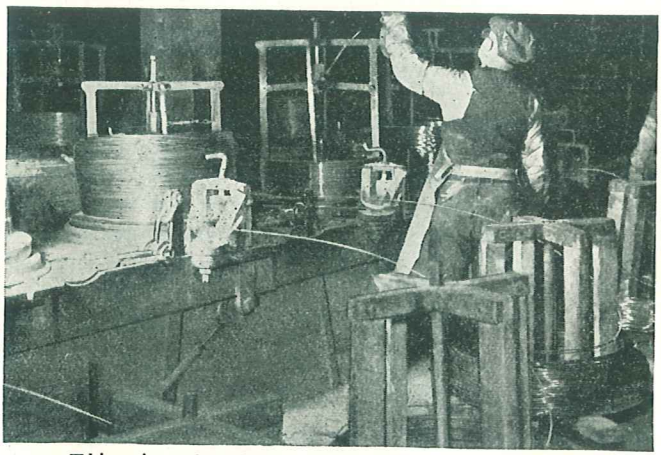
Meanwhile the operator has applied a special grease or other lubricant to make the rod slide through the die as easily as possible without scratching or scoring it, thus endangering the quality of other wire drawn at this frame. Here we see more clearly one of the important reasons for lime coating. Without it the lubricant would skid off the rod under the strong wiping action at the entrance to the die. The coating, however, absorbs the lubricant and holds it where it will do the most good.

The first few feet of rod having been pulled through the die by the drawbar, the end of the resulting wire is now attached to the power-reel, which continues the draw, coiling the wire as it pulls it until the whole rod has been forced through the die and reduced to wire size.



Pointing a rod preparatory to "threading" it into the wire die.

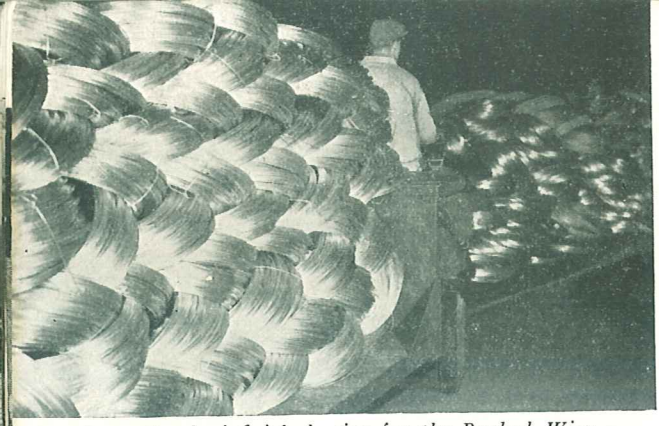
Thus, briefly, we have seen the complete operation of making one draft from rod to wire size. This same operation is repeated as many times as is necessary to get the wire down to desired gauge, since too much of a reduction cannot be made at one draft. The standard gauges of wire most often used in fence usually get from 1 to 7 or even more additional drafts, depending altogether upon the size.



This wire, already drawn, is being re-drawn to a smaller size. The coils on the blocks behind the dies are the re-drawn wire.

Tensile strength:

It is often said by those who would excuse poor wire that the wire must be good or it would not have been able to stand



A truckload of finished wire for the Barbed Wire Department, zinc coated and ready for the machines.

up under the test of the drawing process without breaking. As in all clever fallacies there is a certain amount of truth in this. It is obvious that any wire must have fair tensile strength or it could not have withstood the fierce tugs at the dies which reduced it from rod to wire. On the other hand, however, there are so many points of fact to destroy the argument that satisfactory tensile strength means good quality wire that it would take too long here to touch upon more than two or three of the most important.

To illustrate first with a simple example: a good strong piece of ordinary big manila rope may possess quite enough tensile strength to pull wire through a drawing die, yet manila rope would make a poor substitute indeed for wire fence. The elements would soon rot it out and render it unfit for service. In much the same way, though naturally requiring more time, poor steel, regardless of tensile strength, will "rot" out. In other words, its granular structure will disintegrate under the assaults of rust and temperature changes. So long as the galvanizing lasts (see Page 44), this action is retarded, but once the galvanizing goes the quality of the steel begins to show itself.

Tensile strength in wire is important, but the degree of tensile strength necessary to permit successful drawing is no more a criterion of real tensile strength than it is a criterion of general quality. When we reach the subject of annealing in a moment this will be further explained.

Those who would have you believe that the mere act of drawing wire proves its quality fail also to remember that flawed or improperly made fence wire may very easily possess sufficient tensile strength to permit drawing. As we have seen throughout the steel-making process, imperfect steel may trace all the way back to the pouring of the ingot, and improper composition of the wire may go back all the way to the ore used in the blast furnace. Thus tensile strength is obviously not by any means of first importance in fence wire quality. Nor, by the same token, is drawing a sufficient test of quality. Minute seams from any one or more of several causes; uneven temper caused by impurities in the steel itself; variation of gauge from worn or clogged dies—any of these faults and many

others may be present in finished wire which has successfully withstood drawing. It is for this reason that the control of every step of manufacture from the ore to the finished product—a control which is best centered within one complete organization—has such an important bearing upon the final value of that product in your service.

Perhaps the most important clue to the fallacy of the statement that wire is sufficiently tested by the simple fact of its drawing lies in the actual behavior of steel during drawing operations. It has been mentioned before that *hot working* of steel tends to refine its grain structure, making it tough and dense. But *cold working* causes other reactions. A piece of steel that has been cold drawn will be harder than the same steel would have been had it been hot rolled, but it will also be more brittle. Thus when a rod is cold drawn to wire size each draft through the die makes it harder and more brittle. Eventually, if the wire is drawn enough times, it will become brittle enough to break under drawing tension. Supposing that this might happen on the seventh draft, it is apparent that the sixth draft has made the wire dangerously brittle, although it has not actually broken during this particular drawing.

Fortunately it is possible to control brittleness in wire by heat treatment. Fence wire should always be subjected to such treatment after drawing. This is the process called "annealing."

Figure 1
Photomicrograph showing hot-rolled rod grain structure.

Figure 2
Photomicrograph showing grain structure after 1 *pass.*

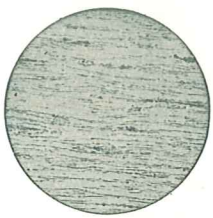


Figure 3
Photomicrograph showing grain structure after 5 *passes.*

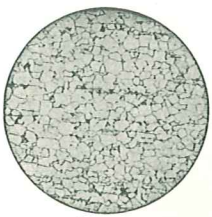


Figure 4
Photomicrograph showing grain structure after annealing.

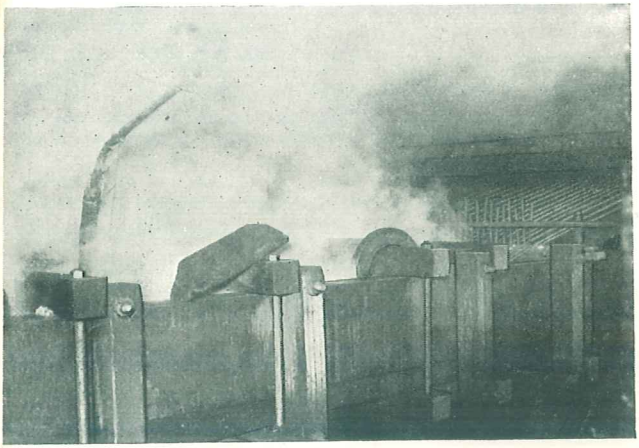
ANNEALING

There are several types of annealing, each designed to produce whatever qualities in the annealed wire will best fit it for the particular use for which it is intended. Since we are mainly concerned here with fence we shall confine ourselves to a description of one process of annealing fence wire.

The photomicrographs of wire taken both before and after it has been drawn through reducing dies show the re-arrangement of grain structure that takes place during drawing. It is apparent here that the shape of the grain in a hot-rolled rod (Figure 1) is so distorted

by each draft (Figure 2) that the ductility of the steel is seriously limited after only a very few passes through the dies (Figure 3). These illustrations, all made from the same piece of wire, also indicate the reason for this. It is clear in Figure 3 that the grains have been compressed to such an extent in the drawing that they represent far less resistance to vertical strain than in their original shape. In other words, the steel is comparatively brittle. The *size* of the grains is unchanged, but they have been crushed and stretched out of their natural shapes and positions.

The molecules that make up these grains, however, much displeased with such a state of affairs, struggle to get back into their natural positions, where they would give the steel approximately the ductility it possessed before drawing. Since they cannot do this while the steel is cold it is necessary to apply heat. This, as the temperature rises, causes the molecules to move about with greater and greater energy until at temperatures of between 1100° F. and 1300° F., maintained for several hours, they have formed new grain structures somewhat similar in character to those present before drawing.



Wire being finally cleaned after annealing and before zinc coating.

A comparison of Figure 4 with Figure 1 shows quite clearly the result of such heat treatment, or annealing. A further study of Figure 4 shows that the grains seem more closely packed and somewhat smaller than in Figure 1. This is brought about by the fact that the annealing process has not been carried on at temperatures high enough to allow complete reversion of the molecules to their former state. In the original condition of the wire, before drawing, the grain structure was too loose to give it satisfactory tensile strength. There was comparatively little interlocking of grains and therefore much less resistance to separation under strain. Since the operation of annealing is controllable by temperature regulation, good fence-wire practice carries it only to the point at which long experience has shown the arrangement of the grain structure to be best fitted for the requirements of high grade fence. Wires for other-than-fence uses are likewise treated especially to give them

the best possible properties for those individual uses, whatever they may be.

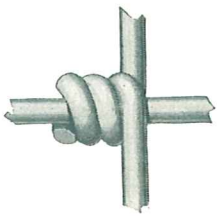
There are so many different processes of annealing, each developed with an eye to the specific uses to which the annealed wire is to be put, and each involving many differences of temperature and time, that it would be highly impractical here to do more than describe just one annealing process in a brief and very general way.

Lead annealing: Highly accurate temperature control is a most important factor in any annealing operation. Since this effect can be achieved quite readily through the medium of a molten lead bath, much wire that is later to be zinc coated is annealed by the lead process. In this process the wire is mounted on reels in front of the annealing furnace, in which is placed a shallow pan (perhaps 20 feet long by 3 feet wide by 12 inches deep) full of molten lead. The wire is now drawn slowly from its reel through this lead annealing bath, then out through the other side to be cooled. Now it is cleaned in hot acid solution and rinsed in hot water. Following this, in order to prevent oxidation by contact with air during drying, the wire is passed through a zinc chloride solution. Now after thorough drying, it is ready for the zinc coating process. This process, since it is an accessory finishing process rather than an essential part of steel manufacture, seems most properly left for description elsewhere (see Page 45).

THE MANUFACTURE OF FENCE

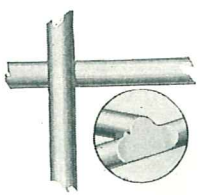
In the main there are two types of wire farm fence—Hinge-Joint and Stiff-Stay. Most fence sellers offer both types, each in a variety of weights and mesh-spacings, depending upon the use to which the fence is to be put on the farm or elsewhere. Hinge-Joint fence, as you probably know, is the type of fence whose joints are wrapped in such a way that some play is allowed for purposes of adjustment in use. Stiff-Stay fence may be either of two general kinds—fence having "locked" joints of the wrapped variety, or fence having smooth, inseparable joints produced by electric-welding.

Most modern fences, both hinge-joint and stiff-stay, are provided with tension crimps or curves in the long line wires, both as an aid to proper stretching and as a means of offsetting stresses set up by elongation or contraction under temperature changes. This is necessary because a steel

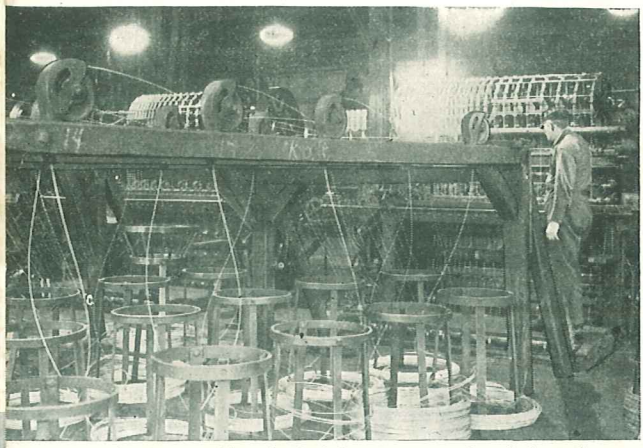


The Pittsburgh Hinge-Joint.

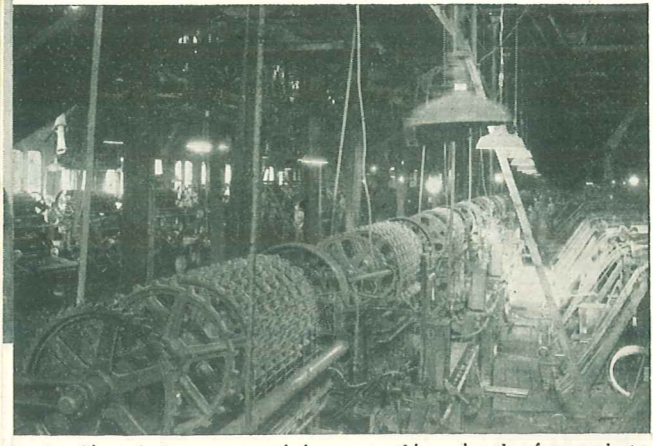
Some type of "tension curve" is used in most modern fences.



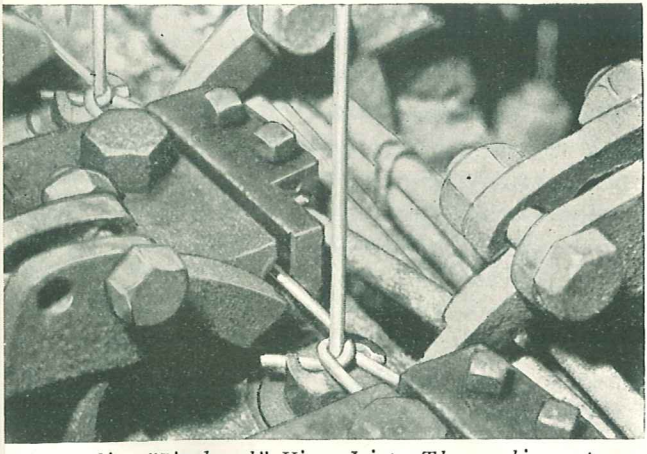
The Pittsburgh Electric-Welded Joint.



Each fence machine is fed by many reels of hot zinc coated wire, all carefully threaded into the "loom."



Looking down a row of fence machines in the fence shop at Monessen Works.



Making "Pittsburgh" Hinge-Joints. The machine automatically wraps the joints and cuts the stay ends.

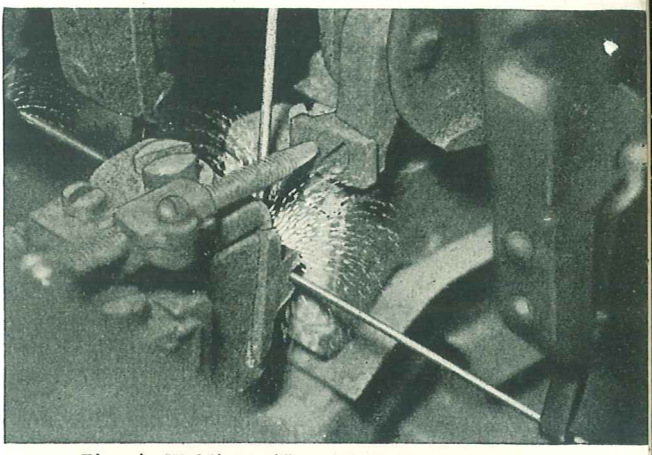
wire is continually changing its length as the thermometer rises and falls. Without some means of taking up these changes every few inches along the fence line there might be trouble from pulled posts or buckling. Tension curves are not required in the upright or stay wires of a fence because of their relatively short length, which never changes appreciably even under the most extreme ranges of temperature.

Some fence sellers have recently drawn specific attention to these tension curves, sometimes leaving the impression that they are special features of certain individual brands of fence. This is of course not the case. Tension curves have been regular features of most wire fences for many years.

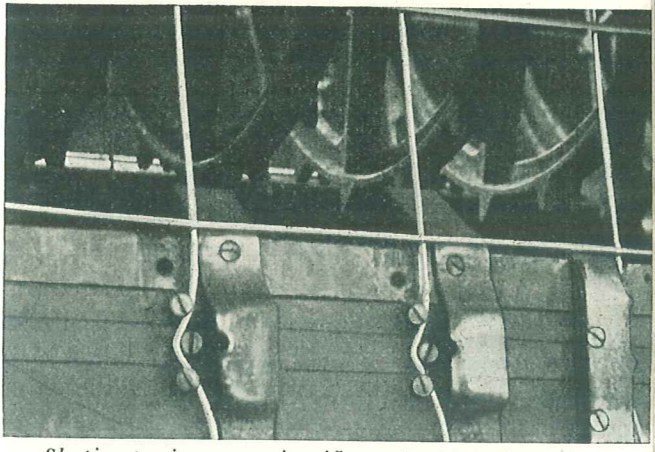
Making hinge-joint fence: The actual manufacture of hinge-joint fence, once the intricate details of machinery adjustment and general preparation have been attended to, is very quickly described. Coils of zinc coated, tested fence wire of the proper gauge are placed on the feeding spindles grouped about each fence machine. The ends of these wires are "thread-

ed" into the machine — line wires vertically, stay wires horizontally. Mesh spacing is automatically governed by the setting of the machine.

When the operator starts his machine, which is in some respects like a heavy weaving loom, but using wire instead of yarn, the strands of stay and line wires are pulled across each other at right angles. At just the proper moment — when the stay spacing has reached the exact required measurements—the movement stops and a set of steel "fingers" flicks out, one at each intersection of line and stay wires, quickly making and weaving a tight, springy hinge-joint around each intersection to tie it together. The machine cuts off the free ends of this joint and the "fingers" jump back until the next cross-stay comes up for similar fastening. Thus, wire by wire throughout the length of the fabric, the fence is woven.



Electric-Welding stiff-stay Pittsburgh Fence to make permanently secure joints.



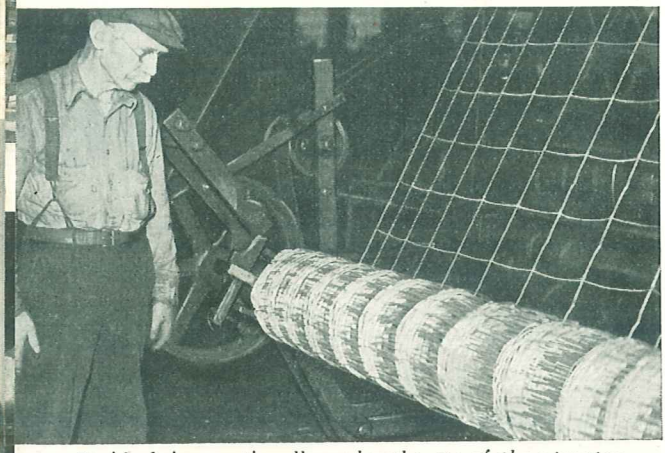
Shaping tension curves in stiff-stay (welded) fence line wires at the rear of a fence machine.

While as machine processes go the fence weaving operation is not so very speedy, the total capacity of such a producer as Pittsburgh Steel Company, operating forty fence machines, is about 370 tons of hinge-joint and stiff-stay fence each 24-hour day.*

Making electric-welded fence: The operation of making electric-welded stiff-stay fence is essentially similar to the hinge-joint process except that a rather spectacular flash-welding operation at each joint replaces the wrapping action of the hinge-joint machines. Just as in the case of the hinge-joint machine, the welding machine draws and spaces stay and line wires automatically, stopping at regular intervals to permit securing of the joints. It is at

**In terms of all No. 9-gauge hinge-joint farm fence, 47" high, 6" stays, this would be approximately 114 miles per day. Other weights and styles would of course vary in number of rods per ton.*

this point that the welding machine comes into play. Fingers heavily charged with electricity make contact at each joint of the fence, creating such intense heat at the point of flash that the two wires of the joint are fused together so inseparably as to defy almost any stress short of the actual breaking point of the wire itself. Try to tear apart the joints of a piece of Pittsburgh electric-welded fence and you will realize just what strides have been made since welding was first introduced so many years ago.



Beside being continually under the eye of the operator, the output of each fence machine is carefully watched by trained inspectors.

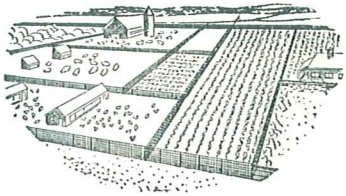
One "room" in Pittsburgh Steel Company's fence warehouse. Trains are loaded from stock here.

Finishing the Fence: In both the hinge-joint and the electric-welding fence machines the fence fabric, its joints completed, passes up over the top of the machine where other sets of fingers grasp every line wire at points between each two stays and form the crimps or "tension-curves." The completed fence, under constant inspection as it slowly comes from the machine, is then wound on a large spool at the outlet side, where it is measured automatically. When the roll on the spool has reached the proper length the fabric is cut and the complete roll given final inspection. Identification tags are then affixed as a means of checking back and placing responsibility for any possible defects. The fence, having passed inspection, is now taken to the warehouse for shipment.

Thus the story of wire fence, sufficiently detailed, we hope, and sufficiently free of confusing competitive claims to have given you a more definitely valuable knowledge of this important subject than you may have had before.

PART TWO

FENCE SELECTION GUIDE CHARTS



THE Fence Guide Charts on the following pages are practically as easy to read as the familiar mileage tables on road maps. It is necessary only to keep in mind the significance of the figures as they are arranged. The groupings of figures referring to farm and poultry fences correspond mostly to customary fence trade practice. For example:

9 - 1047 x 6 - 1
Means No. 9 gauge fence
Stays spaced 6 inches apart
Style 1047 (10 line wires, 47" high)
One strand of barbed wire

Except to keep the chart to a convenient size these figures could have been arranged in columns captioned:

Gauge of Fence	*Style No. of Fence*	*Spacing of Stay Wires*	*Strands of Barbed Wire*
9	*1047*	*6*	*1*

The gauge and style numbers and stay spacings of farm and poultry fences for the most part correspond to the standard fences offered by most fence manufacturers, and as are embodied in Simplified Practice Recommendation No. 9 of the U. S. Department of Commerce. No. 9 gauge fence is made of all No. 9 gauge wires. No. 11 gauge fence has top and bottom wires No. 9 gauge, all other wires No. 11 gauge.

Wherever two or more styles of fence are recommended for one purpose they are to be considered as alternate recommendations, arranged in order of preference.

It is not supposed that the recommendations of this Fence Guide will be followed rigidly by everyone. Individual tastes differ. One stockman as a matter of policy will prefer to build all his hog fences using Style No. 1047 even though the Charts indicate that

Style 832 with three strands of barbed wire will answer the purpose. On the other hand, another stockman may use Style No. 726 fence for the same purpose—and perhaps of a lighter gauge than recommended—with the full knowledge that such fence will not make as satisfactory an enclosure.

In other words these are intended to be just what they are called—recommendations. They are based upon groups of opinions as to what should prove satisfactory fences, with due consideration for the average buyer's necessity for keeping his fence investment as low as reasonably possible. Often a heavier fence than recommended might actually prove more economical or practical in the long run, but care has been taken to avoid "over-specification." A sincere effort has been made to meet buyers' average requirements.

Some agricultural authorities favor heavy board or plank fences for barn yards. These undoubtedly have merit, especially for such enclosures as bull pens. Heavy wire fences are more generally used, however, therefore are indicated on the Chart recommendations.

No effort has been made to recommend as between types of farm and poultry fences, such as hinge-joint and stiff-stay. This might be proper in a few instances, but mostly it is a matter of personal preference on the part of the buyer. It has been our aim in developing the Charts to avoid any recommendations of a controversial nature, or any recommendations that may favor one fence manufacturer over other fence manufacturers.

We have, however, frankly favored the styles of fence included in the Department of Commerce Simplified Practice Recommendation No. 9. There are many off-standard styles of fence offered by some sellers—sometimes a half-gauge lighter, stays spaced farther apart and other departures from standard practice, mostly for the purpose of cutting cost and offering "cheaper" fences. Such fences are seldom offered by reputable manufacturers.

Lawn fences, poultry netting and light weight poultry fences are not included in Simplified Practice Recommendation No. 9. In the absence of authoritative standards we have on these Guide Charts held our recommendations as closely as possible to the best practices of the Industry.

Particularly in the case of lawn fence we have been compelled on the Chart to refer to Pittsburgh Lawn Fence style numbers, since there are no standard style numbers as in the case of farm fence. Other lawn fence manufacturers, however, manufacture styles closely approximating those indicated here; thus the usefulness of this Guide Chart is by no means limited to one brand of lawn fence.

You will note that the use of barbed wire is extensively recommended for stringing above woven wire fence, and in some cases for

an entire fence. No effort has been made to make recommendations as between the different standard styles of barbed wire. This is largely a matter of custom or preference in different communities. For your convenience we show on Page 36 the new uniform Designations for barbed wire as used by the American Iron and Steel Institute, together with specification details. In the future, as these Uniform Designations become better known, you will use them for indicating the style of barbed wire you desire, together with the manufacturer's name, instead of by the many confusing brand names of the different manufacturers that have been used for designation purposes in the past.

A desirable practice where hogs are confined is to string barbed wire immediately under the woven wire fence. This is practiced by many hog raisers and advocated by a number of authorities. For the sake of simplicity we have not endeavored to indicate this on the Charts.

Also we have made no specific recommendations regarding types of posts, but in the fence erecting instructions, Part Four, you will find recommendations regarding the setting of different types of posts.

It is the hope of the publishers and of the farm authorities who have lent their counsel that these Charts will prove helpful both to fence buyers and to merchants who distribute fences. Suggestions for improving the Charts will be welcomed, and will be considered as later editions of this Book are published.

CHART NO. 1 .

	Barnyard & Feed Lots	Small Hog Lots	Hog Pastures
1. Intensive Farming and Corrosive Atmospheric Conditions. *a. General Livestock Including Hogs*	9-1047x6-1	9-1047x6-1 9- 939x6-2	9-1047x6-1 9- 939x6-2 9- 832x6-3
b. Cattle and Sheep	9-1047x12-1 9- 845x12-1		
c. Cattle-Registered Horses-Registered	9-1155x 6-0 9-1155x12-0		
d. Cattle-Grade Horses-Grade	9-1047x 6-1 9-1047x12-1		
2. Average Farming and Average Atmospheric Conditions. *a. General Livestock Including Hogs*	9-1047x 6-1	9-1047x 6-1 9- 939x 6-2	9-1047x 6-1 9- 832x 6-3 11- 939x 6-2
b. Cattle and Sheep	9-1047x12-1 9- 845x12-1		
c. Cattle-Registered Horses-Registered	9-1155x 6-0 9-1155x12-0		
d. Cattle-Grade Horses-Grade	9-1047x 6-1 9-1047x12-1		
3. Large Scale Farming and Dry Atmospheric Conditions. *a. General Livestock Including Hogs*	9-1047x 6-1	9-1047x 6-1 9- 939x 6-2 11- 939x 6-2	11-1047x 6-1 11- 939x 6-2 11- 832x 6-3
b. Cattle and Sheep	9-1047x12-1 11-1047x12-1		
c. Cattle-Registered Horses-Registered	9-1155x 6-0 9-1155x12-0		
d. Cattle-Grade Horses-Grade	9-1047x 6-1 9-1047x12-1		
e. Sheep and Goats	11- 1155x6-1 12½-1452x6-1		

. . FARM FENCE

Farm Lanes	Cornfields & Any Small Fields	Medium Size Fields	Large Fields	Temporary Fence
9-1047x6-1 9- 939x6-2 9- 832x6-3	9-1047x 6-1 9- 939x 6-2 9- 832x 6-3	11 -1047x 6-1 11 - 939x 6-2 11 - 832x 6-3	12½-1047x 6-1 12½- 939x 6-2 12½- 832x 6-3	12½- 939x 6-2 12½- 726x 6-2
9-1047x12-1 9- 845x12-1	9-1047x12-1 9- 845x12-1	11 -1047x12-1 11 - 845x12-1 11 - 832x12-3	11 -1047x12-1 11 - 845x12-1 11 - 832x12-3	12½- 939x12-2 12½- 726x12-2
9-1155x 6-0 9-1155x12-0	9-1155x12-0	11 -1155x 6-0 11 -1155x12-0	9 - 949x12-0 11 -1155x12-0	
9-1047x 6-1 9-1047x12-1	9-1047x12-1 9- 949x12-1	11 -1047x12-1 11 - 949x12-1	11 - 949x12-1 12½-1047x12-1	12½-1047x12-1 12½- 726x12-2
9-1047x 6-1 11-1047x 6-1 11- 939x 6-2	9-1047x 6-1 11-1047x 6-1 11- 832x 6-2	11 -1047x 6-1 11 - 939x 6-2 11 - 832x 6-3	12½-1047x 6-1 12½- 939x 6-2 12½- 832x 6-3	12½- 939x 6-2 12½- 726x 6-2
9-1047x12-1 11-1047x12-1	9-1047x12-1 11-1047x12-1 11- 845x12-1	11 -1047x12-1 11 - 845x12-1 11 - 635x12-3	12½-1047x12-1 12½- 845x12-1 12½- 635x12-1	12½- 845x12-1 12½- 726x12-2
9-1155x12-0 11-1155x12-0	9-1155x12-0 11-1155x12-0 11- 949x12-0	11 -1155x12-0 11 - 949x12-0	12½-1155x12-0 12½- 949x12-0	
9-1047x12-1 11-1047x12-1	9-1047x12-1 11-1047x12-1 11- 949x12-1	11 -1047x12-1 11 - 949x12-1 11 - 939x12-2	12½-1047x12-1 12½- 845x12-1 4 Strands Barbs	12½- 845x12-1 12½- 726x12-2 4 Strands Barbs
11-1047x 6-1 11- 939x 6-2	11-1047x 6-1 11- 939x 6-2 11- 832x 6-3	12½-1047x 6-1 12½- 832x 6-3	12½- 832x 6-3 14½- 832x 6-3	12½- 939x 6-2 12½- 726x 6-2
9-1047x12-1 11-1047x12-1 11- 845x12-1	11-1047x12-1 11- 845x12-1 11- 635x12-3	12½-1047x12-1 12½- 845x12-1 12½- 635x12-3	12½- 635x12-3 14½- 832x 6-3	14½- 939x 6-2 12½- 726x12-2
11-1155x 6-0 11-1155x12-0	11-1155x12-0 11-1047x12-1	12½-1155x12-0 12½-1047x12-1	12½- 949x12-0 12½- 845x12-1	
11-1047x 6-1 11-1047x12-1	11-1047x12-1 11- 939x12-2	12½-1047x12-1 12½- 832x12-3 4 Strands Barbs	14½- 939x 6-2 14½- 832x 6-3 4 Strands Barbs	14½- 939x 6-2 4 Strands Barbs
11- 1155x6-1 12½-1452x6-1 12½-1240x6-2	11 -1047x6-1 12½-1240x6-2 12½-1134x6-3	12½-1155x 6-1 14½-1548x 6-1 14½-1443x12-2	14½-1548x12-1 14½-1443x12-2 14½-1035x 6-3	14½-1035x 6-3

CHART NO. 2 . .

	RANGE METHOD		CONFINEME
	Large Runs	Small Runs	Floors for †Chicks and Poults
1. Poultry Farming Corrosive Atmospheric Conditions			
a. Professional	14½-2360x6-0 15½-2360x6-0 *14½-2158x6-0	14½-2672x6-0 15½-2672x6-0 15½-2360x6-0	12½-1″x1″ Mesh 12½-2″x1″ Mesh 14 -2″x1″ Mesh
b. General Farming Side-line	14½-2360x6-1 *15½-2158x6-1	14½-2672x6-0 15½-2360x6-0	12½-2″x1″ Mesh 14 -2″x1″ Mesh
c. Suburban Side-line		15½-2672x6-0 17 -2672x4-0 20-1″ Mesh 60″ high Poultry Netting.	12½-2″x1″ Mesh 14 -2″x1″ Mesh
2. Poultry Farming Average Atmospheric Conditions			
a. Professional	15½-2360x6-0 17 -2360x6-0 *15½-2158x6-0	15½-2672x6-0 17 -2672x4-0 *15½-2158x6-0	12½-1″x1″ Mesh 12½-2″x1″ Mesh 14 -2″x1″ Mesh
b. General Farming Side-line	15½-2360x6-1 17 -2360x6-1 *15½-2158x6-1	17 -2672x4-0 17 -2360x6-0 18 -2360x6-0	12½-2″x1″ Mesh 14 -2″x1″ Mesh
c. Surburban Side-line		17 -2672x4-0 18 -2672x6-0 17 -2360x6-0 20-1″ Mesh 60″ Poultry Netting	12½-2″x1″ Mesh 14 -2″x1″ Mesh

** Not Suitable for Confining Small Chicks.*

†For Chicks under 4 weeks old and poults under 3 weeks, lay temporary floor of ⅓″ to ¾″ Mesh Hardware Cloth on permanent wire floor.

§For Battery Fronts or Faces, Chicken Feeding Fence, etc., see Special Chart, Page 76.

. POULTRY FENCE

NT METHOD§			
Floors For Broilers & Mature Birds	Poultry Fence For Gardens	Poultry Fence For Orchards	Division Fences Poultry to Live-Stock
12½-2″x1″ Mesh 11 -4″x1″ Mesh	*14½-2158x6-0 *14½-1948x6-1	*14½-2158x6-1 *15½-1948x6-2	12½-2672x6-0 12½-2360x6-1
12½-2″x1″ Mesh 14 -2″x1″ Mesh	*14½-2158x6-1 *15½-2158x6-1	*14½-2158x6-1 *15½-1948x6-2	12½-2360x6-1 12½-2048x6-2
12½-2″x1″ Mesh 14 -2″x1″ Mesh	*14½-2158x6-0 *15½-2158x6-0	*14½-2158x6-0 *15½-1948x6-1	
12½-2″x1″ Mesh 11 -4″x1″ Mesh	14½-2158x6-0 *15½-1948x6-1	*14½-2158x6-1 *15½-1948x6-2	12½-2672x6-0 12½-2360x6-1
12½-2″x1″ Mesh 14 -2″x1″ Mesh	14½-2158x6-1 *15½-2158x6-1	*14½-2158x6-1 *15½-1948x6-2	12½-2360x6-1 12½-2048x6-2
12½-2″x1″ Mesh 14 -2″x1″ Mesh	*15½-2158x6-0 17 -2360x6-0	*15½-2158x6-1 *15½-1948x6-2	

CHART NO. 3 . .

	Front Enclosure	SIDE AND Outdoor Living Room
1. Lawn Fence Needs—Corrosive Atmospheric Conditions		
a. Urban—Single Dwelling	† 9½-736-Double Scroll	† 9½-842-Double Scroll § 9½-842-Single Scroll
b. Urban—Small Apartments	† 9½-736-Double Scroll	† 9½-948-Double Scroll § 9½-948-Single Scroll
c. Urban—Industrial Housing	§ 9½-842-Single Scroll	§ 9½-948-Single Scroll
d. Suburban Plots	† 9½-736-Double Scroll	† 9½-842-Double Scroll § 9½-842-Single Scroll
e. Estates	*Chain Link † 9½-948-Double Scroll	*Chain Link † 9½-948-Double Scroll
f. Rural Town	† 9½-842-Double Scroll	§11-1348 Plain
g. Farm Lawns	† 9½-948-Double Scroll § 9½-948-Single Scroll	§11-1348 Plain
2. Lawn Fence Needs—Average Atmospheric Conditions		
a. Urban—Single Dwelling	† 9½-736-Double Scroll †11-736-Double Scroll	† 9½-842-Double Scroll †11-842-Double Scroll
b. Suburban Plots	† 9½-736-Double Scroll †11-736-Double Scroll	† 9½-842-Double Scroll †11-842-Double Scroll
c. Rural Town	† 9½-842-Double Scroll †11-842-Double Scroll	§11-1348 Plain
e. Farm Lawns	† 9½-948-Double Scroll § 9½-948-Single Scroll	§11-1348 Plain

**If interested in Chain Link Fence Consult a Fence Construction Firm in your District.*
† Non-Climbable—1⅜" between pickets. § Non-Climbable—1⅛" between pickets.

. LAWN FENCE

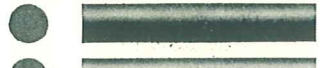
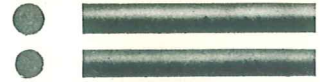
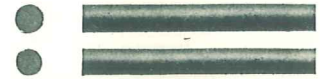
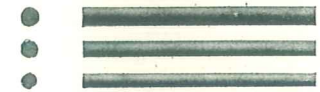
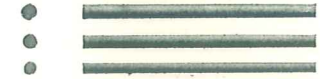
REAR ENCLOSURES			
Adjacent to Poultry	Adjacent to Livestock	Flower Bed Border	Walk Guard
§11-1660-Plain		9½-422	9½-316
§11-1660-Plain		9½-422	9½-422
§11-1660-Plain		9½-422	9½-422
§11-1660-Plain		9½-422	9½-316
§11-1660-Plain	§11-1348-Plain	9½-422	9½-316
§11-1660-Plain	§11-1348-Plain	9½-422	9½-316
§11-1660-Plain 14½-2360x6-0	§11-1348-Plain 12½-2360x6-1		
§11-1660-Plain		9½-422 11-422	9½-316 11-316
§11-1660-Plain		9½-422 11-422	9½-316 11-316
§11-1660-Plain	§11-1348-Plain	9½-422 11-422	9½-316 11-316
§11-1660-Plain 14½-2360x6-0	§11-1348-Plain 12½-2360x6-1	9½-422 11-422	9½-316 11-316

BARBED WIRE DESIGNATIONS

In order to eliminate much of the confusion arising from the use of many brand names for designating each individual style of barbed wire, the American Iron and Steel Institute on September 1, 1934, inaugurated for the general purposes of the Industry the following standard system of designating each style by uniform style number, apart from individual brand names, much as fence manufacturers have long done. Pittsburgh Steel Company is glad to follow this new System, which should greatly simplify for buyers the purchase, handling and sale of the various standard styles for barbed wire.

A.I.S.I. Uniform Designation	Former P. S. Co. Brand Designation	SPECIFICATIONS					
		Pts.	Gauge Strand	Gauge Barbs	Shape Barbs	Space Barbs	Reel Size
No. A 1	K. G.	2	12	14	Round	3″ Hog	100 lbs.
No. A 2	K. G.	2	12	14	Round	5″ Cattle	100 lbs.
No. A 3	K. G.	2	12½	14	Round	3″ Hog	80 rods
No. A 4	K. G.	2	12½	14	Round	5″ Cattle	80 rods
No. B 1	P. P.	4	12	13	Round	4″ Hog	100 lbs.
No. B 2	P. P.	4	12	13	Round	6″ Cattle	100 lbs.
No. B 3	P. P.	4	12½	14	Round	4″ Hog	80 rods
No. B 4	P. P.	4	12½	14	Round	6″ Cattle	80 rods
No. C 1		2	12½	14	Round	3″ Hog	100 lbs.
No. C 2		2	12½	14	Round	5″ Cattle	100 lbs.
No. C 3		2	12½	14	Round	3″ Hog	80 rods
No. C 4		2	12½	14	Round	5″ Cattle	80 rods
No. D 1	P. P.	2	12½	12½	Flat	3″ Hog	100 lbs.
No. D 2	P. P.	2	12½	12½	Flat	5″ Cattle	100 lbs.
No. D 3	P. P.	2	12½	12½	Flat	3″ Hog	80 rods
No. D 4	P. P.	2	12½	12½	Flat	5″ Cattle	80 rods
No. E 1	Monessen	2	12½	14	Half Round	3″ Hog	100 lbs.
No. E 2	Monessen	2	12½	14	Half Round	5″ Cattle	100 lbs.
No. E 3	Monessen	2	12½	14	Half Round	3″ Hog	80 rods
No. E 4	Monessen	2	12½	14	Half Round	5″ Cattle	80 rods
No. F 1	Monessen	4	12½	14	Half Round	3″ Hog	100 lbs.
No. F 2	Monessen	4	12½	14	Half Round	6″ Cattle	100 lbs.
No. F 3	Monessen	4	12½	14	Half Round	3″ Hog	80 rods
No. F 4	Monessen	4	12½	14	Half Round	6″ Cattle	80 rods
No. G 1	Star	2	14	16	Round	3″ Hog	80 rods
No. G 2	Star	2	14	16	Round	5″ Cattle	80 rods
No. G 3	Star	4	14	16	Round	3″ Hog	80 rods
No. G 4	Star	4	14	16	Round	5″ Cattle	80 rods
No. H 1	2-strand Twisted Barbless	..	12	....	.....	.....	100 lbs.
No. H 2		..	12½	....	.....	.....	80 rods

TABLE OF ACTUAL WIRE SIZES

Full Sizes of Plain Wire	Pittsburgh Steel Co's. Gauge No.	Diameter of Steel Wire Gauge	Weight One Mile	Feet to a Pound
	1	.2830	1128.0	4.68
	2	.2625	970.4	5.44
	3	.2437	836.4	6.31
	4	.2253	714.8	7.39
	5	.2070	603.4	8.75
	6	.1920	519.2	10.17
	7	.1770	441.2	11.97
	8	.1620	369.6	14.29
	9	.1483	309.7	17.05
	10	.1350	256.7	20.57
	11	.1205	204.5	25.82
	12	.1055	156.7	33.69
	13	.0915	117.9	44.78
	14	.0800	90.13	58.58
	15	.0720	73.01	72.32
	16	.0625	55.0	95.98
	17	.054	41.0	128.60
	18	.047	31.77	166.20

ECONOMICAL FENCE WEIGHTS

It has already been indicated that, consistent with the demands of usage to which the fence is to be put, and subject to the particular conditions which the individual purchaser has to consider, it is best to use the heavier gauges of fence. As you will see from the following table, a No. 9 gauge wire, for example, has 54% less surface per pound of its steel exposed to corrosion than does a No. 15½ gauge wire; and so on up through the range of gauges, each heavier gauge having proportionately less of its total steel content on the surface than does the preceding lighter gauge. This naturally means that, quality being equal, a fence made of No. 9 gauge wire will be proportionately both stronger and longer lasting than lighter gauge fence because it has less surface per pound of steel exposed to corrosion. Whenever a particular fencing problem indicates a need for

this extra strength and longer life it may pay you to consider seriously the heavier weight, especially if you live in a district characterized by corrosive atmospheric conditions.

TABLE OF COMPARATIVE GAUGE INFORMATION

Gauge of Wire	Diameter	Surface Area on 100 Lineal Feet	Weight of Wire for 100 Lineal Feet	Weight of Wire for each Sq. Ft. of Surface	Surface Area on each Lb. of Wire
9	.1483 In.	3.88 Sq. Ft.	5.87 Lbs.	1.51 Lbs.	.66 Sq. Ft.
10	.1350 In.	3.54 Sq. Ft.	4.86 Lbs.	1.37 Lbs.	.73 Sq. Ft.
11	.1205 In.	3.16 Sq. Ft.	3.87 Lbs.	1.22 Lbs.	.82 Sq. Ft.
12	.1055 In.	2.76 Sq. Ft.	2.97 Lbs.	1.08 Lbs.	.93 Sq. Ft.
12½	.0990 In.	2.59 Sq. Ft.	2.64 Lbs.	1.02 Lbs.	.98 Sq. Ft.
13	.0915 In.	2.40 Sq. Ft.	2.23 Lbs.	.93 Lbs.	1.08 Sq. Ft.
14	.0800 In.	2.09 Sq. Ft.	1.70 Lbs.	.81 Lbs.	1.23 Sq. Ft.
14½	.0760 In.	1.99 Sq. Ft.	1.54 Lbs.	.77 Lbs.	1.29 Sq. Ft.
15	.0720 In.	1.88 Sq. Ft.	1.38 Lbs.	.73 Lbs.	1.36 Sq. Ft.
15½	.0670 In.	1.75 Sq. Ft.	1.20 Lbs.	.69 Lbs.	1.46 Sq. Ft.

Only those gauges included in Simplified Practice Recommendation No. R9 (see Page 54) are included in the above table.

POSTS

While as a general proposition it is safe to say that steel posts will prove most satisfactory from the standpoint of economy, appearance, long life and general efficiency, there may well be times when the use of wood posts will be indicated because of circumstances that make them more easily available on an individual farm. There are treatments by which certain kinds of wood posts can be very well preserved. Wood posts should always be treated to prevent decay regardless of whether or not they are set in concrete. Concrete cannot be depended upon to prevent decay. Our only recommendation about posts, therefore, is that you compare both present and probable future costs over the lifetime of the fence and use whichever type seems most economical in your own particular case.

Remember, however, that poor quality posts, whether wood or steel, will shorten the life of any fence by giving it insufficient support. A fence cannot be stretched tight and kept tight unless the posts are permanently on the job. Good quality long-life posts, either steel or wood, will add years to the trouble-free service you can expect from a good fence.

ATMOSPHERIC CONDITIONS

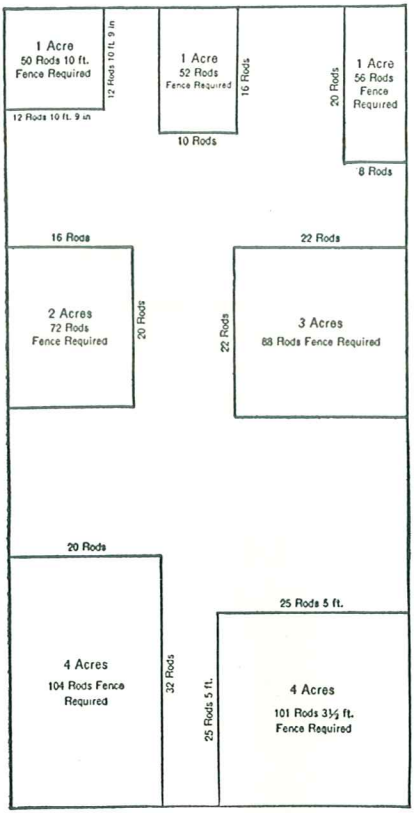
Reference has already been made in these recommendations to the part played by atmospheric conditions in fence life. If your fence is subjected to the corrosive influences of the air in and around most mining and industrial districts, to excessive moisture from any cause or to the salt-laden atmospheres of most coastal regions, its life will undoubtedly be affected by these factors. In such circumstances it is all the more necessary to be sure of absolute quality in buying your fence, and to use heavier weights wherever possible. In dry regions, and where the air may be comparatively free from corrosive elements, it is usually safe to use the somewhat lighter stand-

ard fences, although quality is quite fully as important in light fence as in heavy (even more so, because of the lightness) if the highest value of your investment is to be realized.

AMOUNT OF FENCE REQUIRED FOR SPECIFIC ENCLOSURES

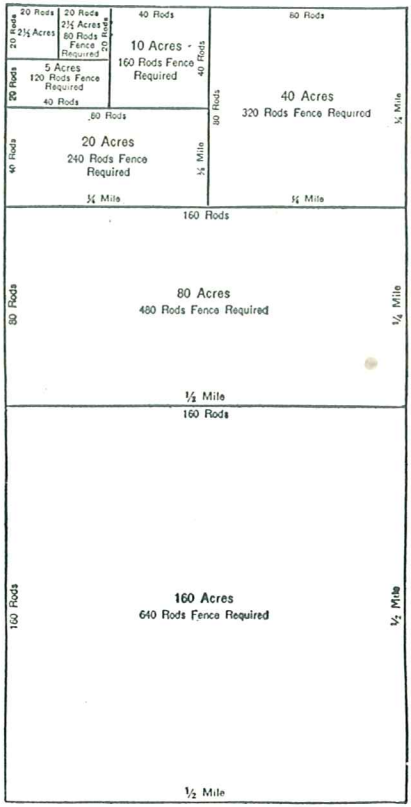
It is very difficult to lay down any general recommendation that will cover individual fencing requirements from the standpoint of actual roddage and footage needed. In the charts below, however, we have indicated enough fields of varying size to give a pretty fair idea of the amount of fence needed in a great number of individual cases. Meanwhile if you do not get the information you need from the Charts do not hesitate to call on the local Pittsburgh Fence Agent for assistance in figuring your requirements; or write us direct if you prefer. In either case you will not be obligated in any way.

Fence Chart No. 1-A



Illustrating one, two, three and four-acre plots, all sides enclosed. Allow a few extra feet for tying around end or gate posts.

Fence Chart No. 2-A



Illustrating a complete half-section divided into individual enclosures of varying sizes. Allow for tying around end or gate posts.

PART THREE

JUDGING FENCE VALUES

DURING recent years the would-be buyer of fence has been subjected to many claims and counterclaims of "superior quality," "revolutionary methods of galvanizing," "extra long life," "better quality for lower prices" and all manner of equally vague protestations delivered in ringing advertisements and excited sales talks. The result has naturally been such confusion that the average fence buyer is almost hopelessly at sea. How can you tell good fence from not-so-good fence; truthful advertising from not-so-truthful advertising? What are the true facts of fence values?

And there is the further confusion of price. You may read that one firm will sell you a wonderful "best quality" fence, freight paid, for something less than the price of standard brands of fence. Another firm perhaps offers you the "world's greatest fence values" at prices that make you wonder. Still others offer you "great" bargains, each better than all the others, according to their respective claims. How are you to judge these paradoxical statements?

Good judgment is impossible without correct information. In the following pages you will find correct information about fence quality, uncolored by clever catch phrases and taken from an experience of more than three decades in the quality steel and fence manufacturing business. No attempt is made here to sell you one brand of fence. The entire purpose is to give you true facts. We want to sell you fence, but first we want to give you the information that will enable you to buy intelligently, whether you decide upon our products or upon those of other manufacturers in the Industry.

STEEL

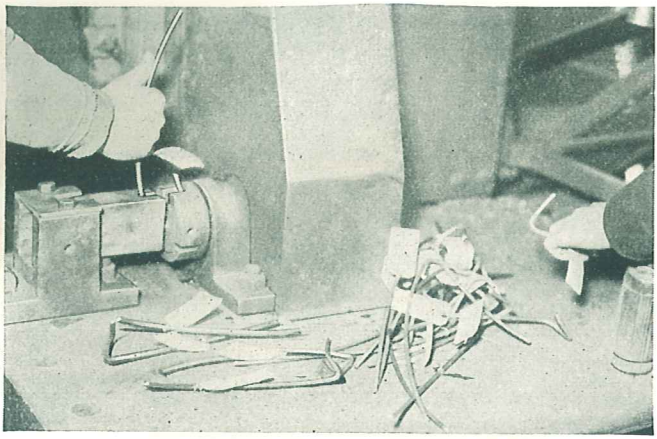
By all odds the most important factor in fence quality and fence life is the steel from which the fence is made. Nothing can outweigh lack of good steel in a fence. Nothing can make up for it.

In Part 1 of this Book the general *methods* of producing steel have been discussed, but nothing has been said of the different *grades* of steel. Analyses of many types can be accurately produced by properly experienced and equipped metallurgists working with the hundreds of alloying and treating elements and processes that have become known through experience and development over many years. These various steels all have their different functions to perform. In the purchase of a piece of cloth you may get cotton, wool or silk—each one of the finest quality—but you would not expect to wear a cotton suit in extremely cold weather, nor do you use silk for overalls. Similarly, you do not want in a fence wire steel that has been produced for the purpose of making springs. Neither do you want the other extreme—a soft steel that gives only a minimum of strength. Obviously it is important to have the *right steel* in fence wire.

To cite one example: the strength of a given quality of steel wire is dependent both upon its analysis and upon the amount of cold working to which it is subjected. In Part 1 the process of annealing has been discussed, and the fact mentioned that the annealing process removes the hardness and brittleness that comes from repeated cold drawing. This of course makes annealing a necessary process in producing fence wire. However, annealing reduces the strength of a given piece of steel to its approximate minimum; hence strength must be achieved by production of steels in which this inherent minimum is sufficiently high for best service. Normally a tensile strength of between 70,000 and 90,000 pounds per square inch of steel cross section should be maintained for a good fence wire. This means that an individual No. 9 gauge wire should have a strength of 1200 to 1600 pounds. Strength of a No. 11 gauge wire should be 800 to 1000 pounds.

This is simply an indication of one of the many factors that can be controlled only by a properly equipped steel manufacturer. *It is of utmost importance to the fence buyer that such control be exercised constantly by the maker of the fence he buys.* Space does not permit here anything like a full treatment of the highly technical subject of steel analysis, but even this brief indication should be sufficient to give an understanding of the great importance of steel selection in fence quality. Please also see Page 44, bottom illustration.

Before we go on to the next subject of interest—zinc coating—it is well also to stop here for a short look at one of the most important activities of the quality steel plant—an activity which perhaps means more to you, the final purchaser of steel wire fence, than any other single factor in production.

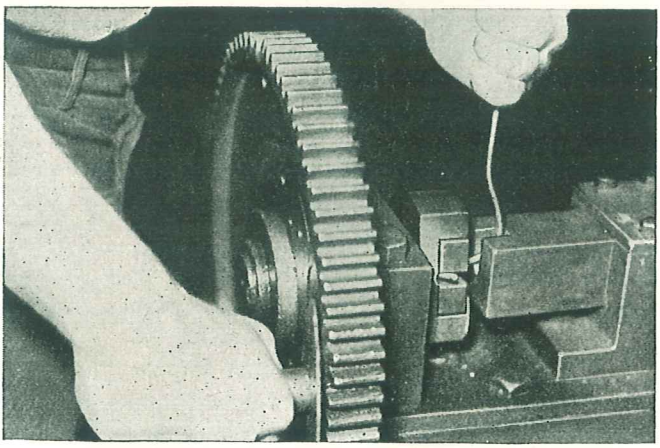


Testing rods by torsional stress for seams or other internal flaws.

Inspection and testing: Perhaps even more than was brought home to you in Part 1 of this Book, the value of the fence you buy is vitally affected by the degree of detailed care and experience prevailing in all the manufacturing operations through which the fence has passed in its evolution from iron ore to a finished product. This is one of the important reasons why complete control of manufacture by one organization—straight through all processes—is considered such a real asset both to the fence maker and to the customers who look to him for expert "quality engineering."

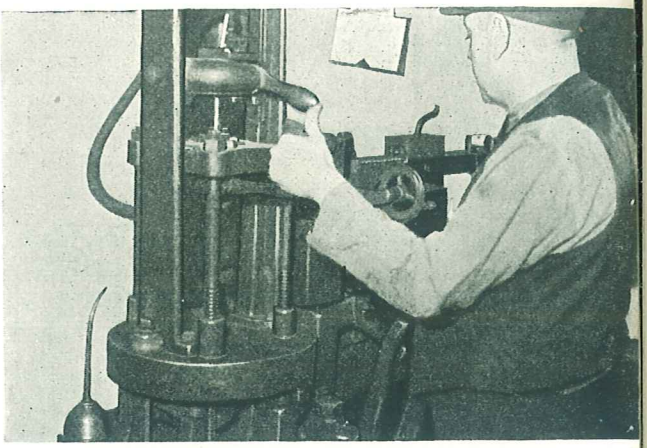
After careful manufacturing technique and proper manufacturing equipment, inspection is one of the chief means of control of product uniformity. In order to give you a close view, therefore, of the part inspection plays in quality fence manufacture it may be well to outline the general inspection procedure as applied to steel, wire and fence manufacture in the plants of Pittsburgh Steel Company.

An Inspection Department, we feel, should be entirely divorced from the Production Departments whose work it must accept or reject upon no other basis than that of quality. By such an arrangement—the arrangement under which Pittsburgh Products are made—inspectors are free to exercise their best judgment and experience entirely in the customers' behalf. In addition, however, and working on the theory that defects are much better prevented than remedied, this Inspection Department does not confine itself alone to inspections and testings of finished products. It also places its trained men to observe and ad-



Testing wire by torsion to disclose any possible hidden seams or cracks below the surface.

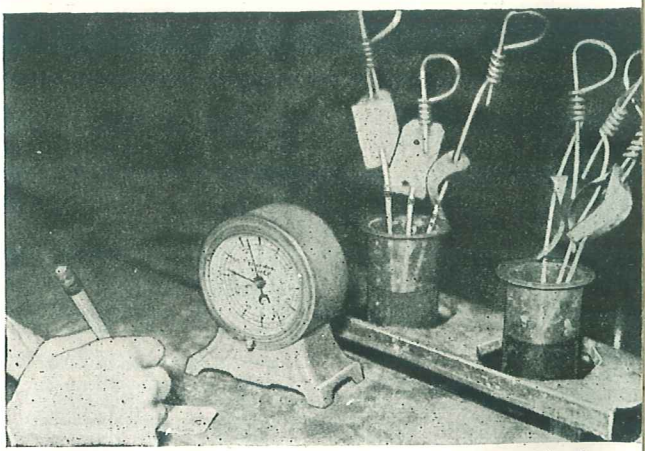
vise at every important stage of manufacture, from the furnaces* to the fence machines. Thus the entire steelmaking process is carried on under close scientific inspection control, the inspectors working closely with the melters to prevent in every individual heat of steel by every means known to their combined experiences and to steel making generally the development of any qualities that might cause possible defects—hidden or otherwise—in the wire and fence later to be made from that steel. To enter here into a description of the details of this control would necessitate a lengthy discussion of perhaps little interest to any but the scientifically minded. Its scope and importance, however, are indicated by the unusual freedom from ordinary manufacturing troubles we have experienced in our plants ever since the system was begun.



Testing wire for tension. Each coil of wire must pass this test satisfactorily or be rejected.

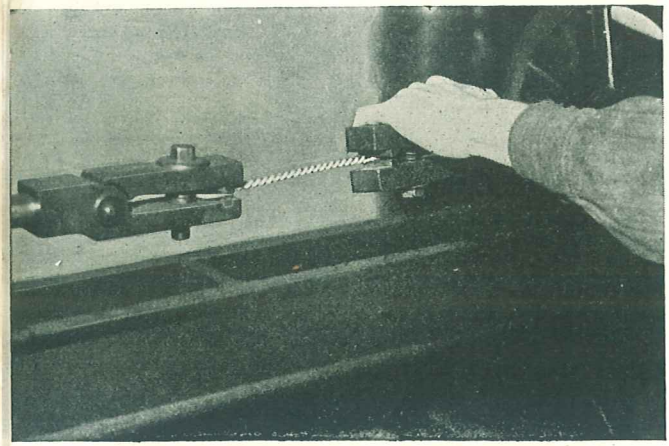
Passing on from the open hearth to the blooming mill, we find other inspectors — trained men who are empowered to accept or reject each ingot before it goes to the soaking pits, and who closely watch the heating and rolling of the steel, ready to throw out any piece should it appear to be unsuited in any way for the purpose for which it is finally intended.

Again at the rod mill we see a careful combination of inspection and testing which covers every coil of rod as it comes from the reels. Samples are cut from



Testing samples from each coil of hot zinc coated wire by the "Preece" test for uniformity of zinc coating.

**In connection with Pittsburgh Steel Company's Open Hearth inspection it is interesting to note that the so-called "Controlled Steels" so widely advertised of late are products of the same sort of close inspection control adopted by this Company more than 10 years ago. Many of the widely publicized new steel cleaners and deoxidizers were, in fact, developed in Pittsburgh Steel Company's open hearths—principally because our control methods here have long had the reputation of being among the most accurate and complete in the entire Industry.*

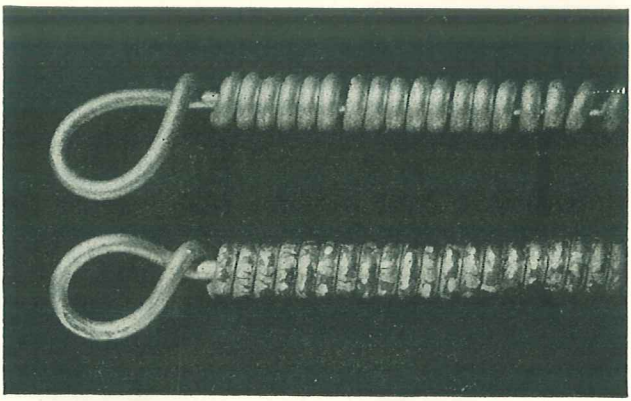


Testing hot zinc coated wire for bond. If the coating flakes the coil of wire is rejected.

each coil, gauged for size and physically tested for seams or other flaws. Not only do these inspectors throw out any possible defective coils, but they are also empowered to shut down an entire rolling mill at once if the product shows that anything in the set-up or adjustment of the mill may cause quality trouble. Prevention again.

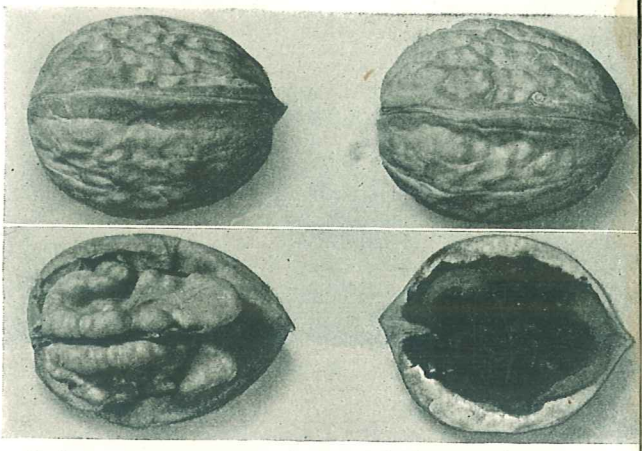
Again in the wire mill, as wire leaves the drawblocks, it is gauged for size and inspected for possible flaws. And again, after hot zinc coating, each individual coil is tested for bond, any coil whose coating is in any way defective being discarded. Zinc coated wire is also machine-tested for temper by tension and torsion, for uniformity of the coating by "Preece" test (see Page 55), and for weight of coating by "antimony chloride" (stripping) tests, all wire being immediately rejected if in any single particular it fails to meet the uniform quality standards we have set up for Pittsburgh Fences.

Thus the highlights of inspection as it is carried on throughout every stage of the manufacture of quality fence. Added to all this, of course, is the final inspection of each roll of fence as it comes slowly from the machines, and the periodic check-weighing, check-measurement and actual erection of random rolls of fence for best possible knowledge of the continuing quality of the product and for best control of the production factors that go so far to make this quality. A costly business, it is true, but the only means of insurance against wavering quality and uncer-



Here is a good example of the importance of the right steel in fence wire. These specimens were galvanized in the same way, side by side and simultaneously. The top specimen is Pittsburgh Fence wire. The bottom specimen is a different steel, although no one could tell the difference except by analysis. The Pittsburgh wire has been bent around its own diameter without cracking or peeling of the zinc coat. The coating on the other wire is badly cracked. It is obvious that the steel "core" has a great deal to do with the life of any zinc coating.

tain service of the product in the hands of those who, like yourself, depend upon it to help you make the most of your time, your labor, your knowledge and your capital.



Surface appearances are often poor indicators of actual quality. Like these two walnuts, two galvanized fence wires may have equally attractive outer "shells," but still be totally different in interior quality and soundness.

Hot Zinc Coating

There is so much general popular misinformation about fence galvanizing—so many misleading, impossible things have been said about it—that it has often been extremely difficult for the layman to consider the subject in its proper *secondary* importance.

It is true that a coating of zinc will protect fence wire against rust for a certain period of time. It is also true that a good, smooth, well-bonded, non-cracking, non-peeling coating of zinc will protect better and longer than a poor, cracking, peeling coating of zinc. For this reason reputable fence makers have for years been careful to apply good quality zinc coatings to their fences. Even cheap fences are usually well enough galvanized to appear to good advantage in comparisons with real quality merchandise. The best of zinc coatings, however, add nothing to tensile strength or toughness or uniformity of the wire itself. Thus the purchaser of an inferior fence runs the decided risk of paying out a large proportion of his fence dollar for an attractive zinc coating and a smaller proportion for actual basic steel quality than if he had decided upon one of the standard fences at perhaps a little higher price. In considering the question of fence life it is therefore apparent that the primary emphasis should be placed not upon galvanizing but upon *steel.*

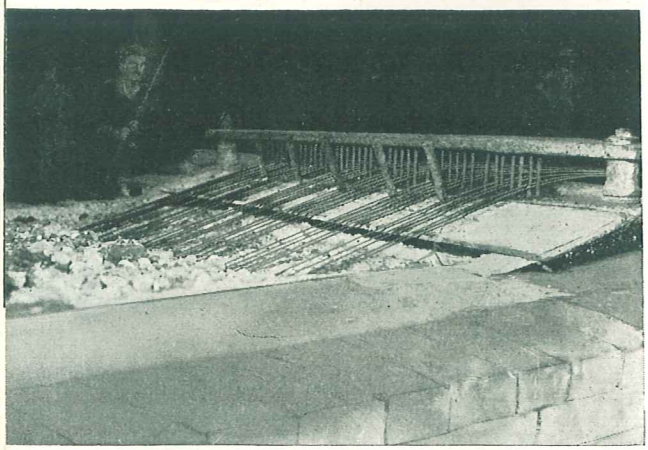
The zinc coating on any fence, since it is itself subject to corrosion, can be only a relatively temporary protection against the elements. This protection usually lasts from seven to about twelve years, depending somewhat upon climatic conditions. After it is gone fence life depends entirely upon the steel itself. A fair parallel may be illustrated with two houses. One is well built of solid timbers; the other is cheaply built and its timbers are old and soft. Paint both with good paint and they may look equally good, but underneath the good paint it is obvious that the cheapness of the second house is hardly cheap at any price. When the paint is gone there is nothing much underneath but a liability.

Although it is necessary here to tell the simple truth about galvanizing in order to de-bunk it we do not want to leave any impression that galvanizing is unimportant. It is important, but the thing to remember is that it is by no means the most important factor in fence quality.

Galvanizing methods: Before we leave the subject of galvanizing it is well to describe briefly just how galvanizing is done. The fact that it is merely a finishing process, and thus in no sense a basic part of steel manufacture, made it seem proper not to include its description along with the discussion of basic steel values in Part 1.

The method of galvanizing most practical for fence purposes and therefore most used by fence makers is the hot-dip process. This process varies, sometimes in important particulars, among different manufacturers, but in the main, the process may be described as the passing of properly heat-treated steel fence wire through a bath of molten zinc. As the wire slowly passes through this hot bath the surface of the steel all along reacts to heat somewhat as the pores of your skin react to warmth — it "opens up," absorbing zinc and causing it to merge with the wire in a tight bond. The longer the wire remains in the hot zinc bath, up to a given point, the better-bonded and the heavier the zinc coating will be. Thus the zinc coating operation is carried on very slowly in order that best results may be realized.

As the wire emerges from its zinc bath it naturally drips hot zinc. Since this *surplus* is not bonded to the steel, and since it will if it is allowed to remain cause a lumpy or otherwise non-adherent surface that may flake or peel, it is ordinarily "wiped" and smoothed down. This "wiping" is accomplished by passing the dripping zinc-coated wire through a loosely adjusted asbestos "lever wipe" (see photograph) immediately after it has left the molten zinc bath.

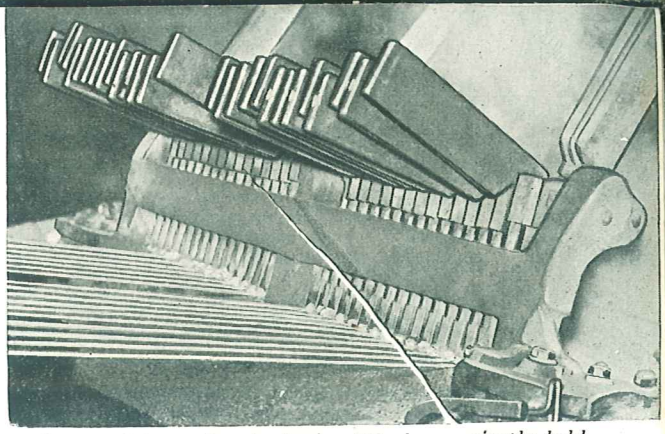


Annealed wire entering the bath of molten zinc in the hot zinc coating process.

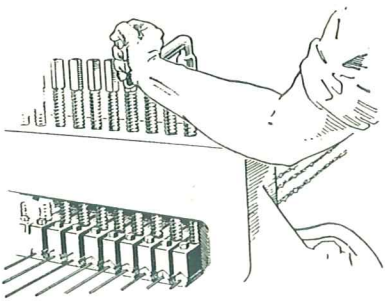
It is possible by the substitution of "screw wipes" (see the drawing) to get a tighter adjustment on the wipers than is possible with lever wipes, and thus to save zinc by wiping off too

much of the coating, but this practice is not followed by reputable fence manufacturers.

There is still another basic refinement of the general method of hot zinc coating fence wire, involving among other things the use of charcoal beds instead of lever or screw wipes. This process — used by Pittsburgh Steel Company to produce its Premium Hot Zinc Coated fences elsewhere described—is discussed under the head of "Special Processes in Galvanizing."



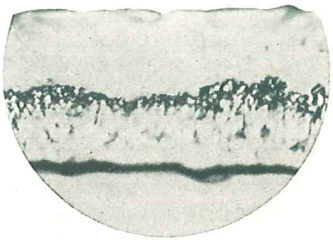
Lever-wiping galvanized wire. The levers simply hold the asbestos in place.



This drawing illustrates the tight compression of wipes possible with screw wipe equipment.

Results of galvanizing:

To the uninitiated it would seem that the heavier the galvanizing the better the protection. The fact is, however, that a too-heavy or improperly applied coat of galvanizing will crack and peel in service (see Page 44), leaving the fence actually less thoroughly protected than if the coating had been lighter. Thus it is that the weight of galvanizing may or may not mean anything in fence life. Fence sellers will often call your special attention to the weights of their zinc coatings, sometimes suggesting "blue vitriol" tests as a means of demonstration. Aside from the fact that such tests have no direct bearing on the weight of the zinc coating on a wire,* they also fail to show how well the zinc has been bonded to the wire. If the coating is well bonded and fused into the "pores" of the steel, the heavier the better—provided the cracking point is not reached. Beyond this point, however, any added weight of zinc coating is actually harmful. Uniformity and bond and purity are far more significant.



Longitudinal section of premium hot zinc coated wire, showing character of bond. The rough edges appear as the result of high magnification. Also see page 50.

**This test (Preece test) is used by all fence manufacturers as a means of proving the uniformity of a zinc coating—not its weight. For further information please see Page 55.*

The fence manufacturer's integrity and ability and experience are after all your best means of assurance that you will get all-around good galvanizing value for your fence money, year in and year out. By all means know who actually makes the fence you buy. You are entitled to this information.

SPECIAL PROCESSES OF GALVANIZING

By DR. S. A. BRALEY

Pittsburgh Steel Company Fellow—Mellon Institute

From the foregoing discussion it will be seen that most fence wires are reasonably well galvanized. Some few manufacturers may use "screw wipes" for fence wire, but the major portion of wire is galvanized by the "lever wipe" process. Recently, however, much has been said about various new and revolutionary methods of production, hence it would seem fitting that a brief semi-technical summary of these processes should be outlined here.

As stated above, the most common method of galvanizing is the "hot dip" process, and two methods—namely "screw wipe" and "lever wipe"—have been discussed. A third method of hot dip galvanizing is the "charcoal wipe" process, in which the excess spelter or zinc is wiped by being drawn from the molten zinc through a layer of pulverized charcoal which, because of its looseness, permits a greater portion of zinc to adhere and at the same time produces a smooth wire. The surface of the zinc in this procedure thus maintains an unbroken outside film, which is more resistant than the usual coatings to atmospheric attack. Whenever a zinc coating is wiped, as in a screw or lever wipe—or "polished" by being drawn through dies, a practice employed by some manufacturers to obtain brightness—this film is greatly broken, and attack by the atmosphere occurs much more readily.

Still a fourth method is the "multiple dip," wherein the wire, after emerging from one pan of zinc, re-enters a second, and even a third pan, to build up the coating of zinc by degrees. While this method does achieve a sufficiently heavy coating, nevertheless the emergence of the coated wire into the air prior to entry into the second bath, which is at a somewhat lower temperature, produces a coating of which the layers are different in texture and hence less resistant to bending without cracking. Tests of fence wire produced by this method have also shown a marked lack of uniformity of coating.

All the "hot dip" processes cause a definite bonding between the steel and zinc, and if this bonding layer is properly controlled each

produces a very good adherent coat; their value then depends on the conditions under which they are produced, the thickness of the zinc and the quality of the zinc.

Another galvanizing process is the electrolytic process, in which the zinc is plated on the wire much the same as silver is plated on table silverware. The adherence of this coat is entirely mechanical, and does not depend on a metallic bonding such as obtained in "hot dip" processes; and while any thickness of coating can be applied, the cost of the plating operation does not permit these coatings to compete with the heavy coatings produced by hot dip methods. Also, in the plating processes, gas is given off at the same time the zinc is plated. This has a tendency to produce a porous and dull coating. To obtain brightness these porous coatings must be drawn through dies or otherwise polished, which naturally disturbs the character of the coating. And of course the polishing does not get beneath the surface of the zinc and correct the porosity there.

In the past, there has been little difference between the fences produced by reputable producers. However, with new developments, more differences are today apparent. Reproduced (next page) are photomicrographs of cross-sections of wire from 6 different brands of fence, all purchased in the open market in January, 1937. These photomicrographs are taken at 500 magnifications *(see Editor's Note, Page 51)*. Figures 1 and 2 show opposite sides of the same piece of wire, and illustrate the non-uniformity of coating which may be present on a piece of wire if proper operating conditions are not maintained in its production. Figures 5, 6 and 7 show wires with comparatively light and impure coatings; i. e., the zinc contains very high percentages of iron. Figure 4 shows a heavy coating of pure zinc on top of the alloy (bonding) layer—an ideal condition. Figure 3 shows a plated coating of pure zinc (no bonding layer with the steel base). All of these photographs are taken on the same scale, hence the difference in thickness of these layers shows the actual comparative thickness of the zinc applied *(see Editor's Note, Page 51)*.

Inasmuch as quality of zinc has been mentioned, a brief discussion of this vital factor is in order here. Zinc is a metal produced from ore by much the same process used in producing iron from its ore. Naturally zinc produced in this manner contains certain other elements, such as cadmium, lead, tin, etc. The presence of these impurities causes the zinc to become brittle and lose its ability to elongate or stretch. In addition, their presence causes a more rapid reaction of the elements on the zinc when exposed to the weather. This is noticeable in a poorly galvanized bright zinc wire, in that it

dulls more rapidly than a bright zinc wire which is made by use of extra high grade zinc.

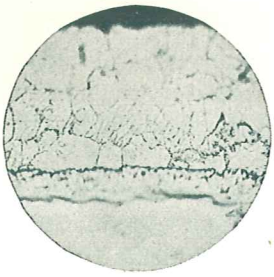


Figure 1
Brand "A" Fence
(See Figure 2)

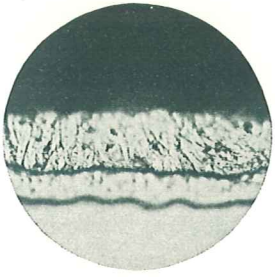


Figure 2
Brand "A" Fence
(Opposite Side of Wire)

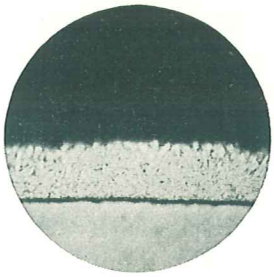


Figure 3
Brand "B" Fence
(No Alloy Bonding Layer)

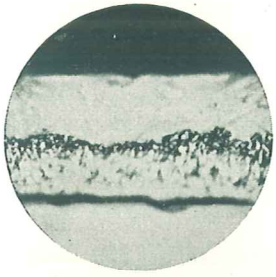


Figure 4
Pittsburgh Premium Hot Zinc Coated Fence
Pure Zinc Outer Layer; Zinc-Alloy Under Layer

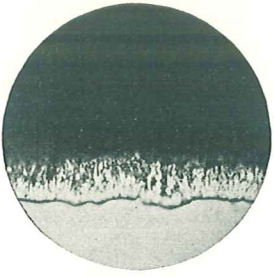


Figure 5
Brand "C" Fence
No Pure Zinc Layer

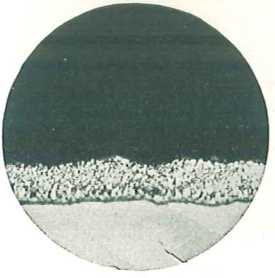


Figure 6
Brand "D" Fence
No Pure Zinc Layer

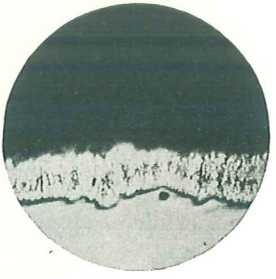


Figure 7
Brand "E" Fence
No Pure Zinc Layer

The zinc used on the new Premium Hot Zinc Coated Pittsburgh Fences is this extra high grade zinc, which analyzes 99.99% pure zinc; hence the only impurities are the intentional small amounts of iron in the alloy bonding layer between the steel and the pure zinc outer layer. 99.99% pure zinc is the purest zinc commercially produced, and when applied so as to produce a bonding layer with

this pure zinc outer layer which has not been touched by film-disturbing wipes, it gives the ultimate of protection and maximum period of brightness. I am sure this explains why it is that these fences have a long-lasting silvery bright appearance, achieved without polishing of any sort.

Editor's Note: The end of a No. 9 gauge wire magnified 500 times will be a circle something over 6 feet in diameter. Too often in advertisements and other attempts to demonstrate comparative zinc thickness on wire, retouched photomicrographs or out-and-out drawings are used. Usually these look something like the following examples:

Such illustrations as these are obviously highly exaggerated. The thickness of the zinc coatings as represented is shown out of all proportion. To be true representations the wire would have to be many times larger than it is ever shown in such pseudo-illustrations.

It being manifestly not possible to show a No. 9 gauge wire magnified 500 times in less than 6 feet of space, Dr. Braley's unretouched photomicrographs shown on Page 50 include only a small portion of the steel in each wire, although the entire thickness of the coating of galvanizing is shown in each case.

It is never possible to make proper comparisons between photomicrographs unless it is known how many magnifications have been made. Above all ***no retouching should be permitted under any circumstances.*** *Always insist upon seeing actual, unretouched photomicrographs, with the number of magnifications clearly indicated.* ***Do not accept drawings or retouched photomicrographs*** *as evidence of coating thickness, structure or quality. This is a highly important warning to observe if you would avoid being seriously misled.*

COPPER BEARING STEEL

Now to come to another fence quality factor which perhaps has been confused by too much half-truth.

Competent authorities agree that the presence of an adequate percentage of copper in steel materially increases its resistance to atmospheric corrosion. It is also a fact, however—and here is where most of the confusion has arisen—that just "some copper" is not a sufficient description of true copper-bearing steel. *Some* copper may or may not mean *enough* copper to produce the desired rust-resistant effect.†

The term "copper-bearing" steel has come, through usage, to mean steel which actually contains not less than .20% of pure copper. That is twenty one-hundredths, or two-tenths of one per cent. It is not twenty per cent. Twenty per cent of copper in a fence would not only be altogether unnecessary; it would be expensive beyond all reason as well. Some fence sellers prefer to speak of the copper in their offerings in terms of "points" rather than in terms of percentage. The layman reading that a fence contains "15 points copper" sometimes assumes that the fence contains fifteen per cent copper. It does not. It contains only fifteen one-hundredths of one per cent copper, which is not enough to qualify it under the true meaning of the term "copper-bearing steel" as this term is understood by usage in the fence trade.

For many reasons it is impossible to maintain a perfectly even content of any ingredient throughout a heat of steel. Best commercial practice therefore allows a variation of one-tenth of one per cent. Thus copper-bearing steel is actually steel which contains not less than .20% copper, although it may contain as much as .30% copper, or one-tenth of one per cent more than the minimum. Translated into terms of pounds this means that true copper-bearing steel contains never less than 360 pounds of copper per 90-ton heat, and often as much as 540 pounds or even more. These quantities are quite sufficient to produce fence of excellent rust-resistant qualities, even without any zinc coating whatever.

It is important to remember the significance of the term copper-bearing steel. Such unqualified terms as "copper-content" or "contains copper" do not have the same meaning at all. On the other hand they may possibly signify that the steel contains less than .20% copper, and is therefore less resistant to rust than true copper-bearing steel. Ask about the amount of copper in the fence you buy. Insist that it be *at least* .20%. That means twenty one-hundredths of one per cent, or "twenty points."

†*Many specimens of old time "iron" wire of fifty or sixty years ago—specimens that displayed high resistance to atmospheric corrosion—have been analyzed chemically and found to be just ordinary steel, but containing copper. Since the Eastern ore deposits contained a good deal of copper, the early American steels made from them were, more by accident than by design, "copper-bearing."*

GUARANTIES

The guaranty has been used in almost every field of merchandising, including the fence business. It is particularly useful to the new manufacturer undertaking to sell an unknown product in competition with well known brands of established prestige.

The guaranty, however, has often been abused, failing in its assumed protection to the consumer either because of impossible terms and conditions or because of deliberate use to clothe inferior quality with an impression of merit. Those who use the guaranty in this way rely chiefly upon the human inclination to "let it go" rather than to "stir up trouble" if the shortcomings of the product happen to be observed.

All manufacturers who make and sell standard brands of fence are not only willing but anxious to adjust fairly and quickly any shortcomings that may possibly occur in their products through oversight or otherwise. The value of his prestige and good will is far too great to permit any reputable manufacturer of long years' standing to deviate from a policy of giving his customers every possible satisfaction. Such all-inclusive protection as this transcends that of any technically worded "certificate."

MANUFACTURERS' QUALITY STANDARDS

Of far more importance to you than guaranties is the quality policy of the manufacturer who makes your fence. You have already seen that at strategic points throughout quality steel and fence manufacturing operations inspection assumes major importance. You have seen, too, that materials which for any reason do not pass rigid inspection standards are discarded.

The reason for this policy is two-fold. First, we want no seller of cheap quality fences to be in position to advance the claim that his product is made of "Pittsburgh" quality wire. Second, we want no purchaser of any wire fence, no matter what brand, to have reason to be dissatisfied with his purchase. You buy woven wire fences and your neighbors and fellow land-owners buy them because you really need them to increase the efficiency and the utility—and thus the profits—of your lands and your labor. It is our business as suppliers to you to see that you receive your full money's worth of value in the fence you buy. Otherwise you will not realize the full benefits to be gained from proper fencing.

We do not want to leave you here with any impression that we are the only Company in our Industry adhering to such a policy. Here, as elsewhere in this Book, we use our mills and our Company

as examples because we are most familiar with our own business. There are other fence manufacturers of high integrity. Our purpose in telling you these facts about fence and about policies is not to set our Company above our competitors, but to give you the full knowledge to which you are entitled when you go to buy such important equipment as fence. It is not enough to tell you to look for high quality products. You must know what factors go into the making of high quality products, and how it is possible to identify these factors in the background of the manufacturer who makes the products.

STANDARD FENCE SPECIFICATIONS

In the year 1923 the National Fence Manufacturers Institute made a survey to determine what and how many styles of farm and poultry fences were being produced by the entire Fence Industry, including all sources. There were found to be 552 styles, each differing in some respect of gauge, height, weight or spacing of wires. In July of that same year, the U. S. Department of Commerce sponsored a conference which included representatives of the fence manufacturers, representatives of the fence distributors and representatives of the fence users—principally farmers. The purpose of this conference was to effect simplification of this jumble of fence styles, eliminate off-styles wherever possible and generally standardize upon certain gauges, meshes and heights in order to avoid the continued waste caused by the practical necessity of manufacturing and stocking an excessive variety of styles to meet competition. The benefits to users of fence were clear. The fence buyer would no longer have to pay his share of the cost of making styles for which there was no real need. Economies of production always enable a manufacturer to pass real savings on to the consumers of his product. Better quality is possible. Better standards result. Everyone benefits. Everyone, that is, but those sellers whose main business channel is the handling of off-standard merchandise.

As a result of this conference the Department of Commerce cooperated in the issuance of Simplified Practice Recommendation No. 9. These Recommendations, with some subsequent revisions, are now the basis which practically all makers of standard brands of fence have for the most part adopted. Thus have been eliminated from among these brands something like 490 styles characterized by "between-gauges" and other off-standard variations.*

A list of these standards—together with a list of the fence manufacturers and organizations who have agreed to adhere to them — is available from the Government Printing Office. Either send 5c to

**The fences considered were field fence and poultry fence, 15½ gauge and heavier.*

the Superintendent of Documents, Government Printing Office, Washington, D. C., or ask your Congressman for a copy free.

TESTS

The science of testing is a factor of tremendous importance in every branch of modern American manufacturing. Because this is so obviously true it may seem to the layman who is unacquainted with such things that if only he could have some simple means of testing for quality factors in any product his buying problem would be solved. Could quality be proved by test he would need only to concentrate on price—or so it would seem reasonable to believe.

There are, in fact, many industrial buyers who either independently or through societies representing groups of buyers conduct research activities and set up quality standards to guide themselves in their own buying as well as to assist manufacturers in product-development work. In much the same way some buyers are able to set up real testing laboratories for thorough scientific examination and study of materials they recurrently purchase. Large railroads, for example, often run systematic series of tests covering many widely diversified items on their regular buying lists. Other large industries have similar organized facilities.

Such activities are decidedly welcomed by the reputable manufacturer, whose best interests are naturally served by and who has a genuine appreciation of intelligent, sincere attempts on the part of his best customers to reveal all the quality he has built into his merchandise.

Unfortunately for the individual consumer, however, most independently made tests are likely to be misleading—and therefore worse than useless—unless they are scientifically and accurately conducted by experienced testing engineers under rigidly balanced conditions. For example: the seemingly simple copper-sulphate (Preece) test for zinc-coating, properly performed by experienced test conductors, is very useful in demonstrating galvanizing uniformity. As performed under such correct conditions, usually in conjunction with "stripping" and "mandrel" tests, and with perfectly clean samples accurately timed in chemically exact solution under controlled temperature, this test tells the truth about galvanizing uniformity. The same test, however, performed—as has sometimes been suggested—by a layman who merely sticks a piece of galvanized wire into blue vitriol, may more easily than not give an entirely different story. Invisible dirt or greases, or other factors that might make these samples unrepresentative; inadequate facilities for correct timing; improper strength of acid solution; lack of temperature regulation—any of these or any of many other similar

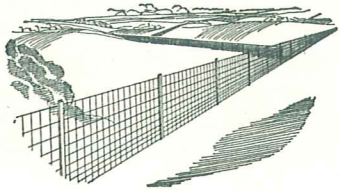
governing factors whose existence is not known to the general public may turn such a test into a direct contradiction of the actual truth.

There is in fact already a rather widespread public belief that this test is designed to reveal the weight of zinc coating on galvanized wire. Such is not the case. A *heavy* coating of *pure* zinc will withstand *fewer* one-minute immersions in copper-sulphate (blue vitriol) than will a *lighter* coating of *impure* zinc. Thus it is that the value of this test lies only in its ability to show uniformity of application of the zinc coat. It *does not show the amount* of zinc in the coating.

In the absence of necessary laboratory facilities, and not having the technical knowledge necessary for proper testing and interpretation of samples *taken directly from the rolls, pieces or packages of materials under consideration,* the individual buyer must place his reliance upon the reputations of the manufacturers who make the things he buys. Such reliance, carefully, thoughtfully and justly placed, is usually a far better buying basis than most amateur tests can ever be.

A number of extremely frank statements have been made in this discussion of "Judging Fence Values." Perhaps by their very frankness they have surprised you. We have dared to be so frank because we believe that fence buyers, representing as they do a substantial property owning group, will make intelligent use of the information. Fence is too important an item of investment for buyers to be influenced either by careless or by deliberately misleading sales presentations.

PART FOUR
HOW TO ERECT FENCE



CAREFUL erection is of inestimable importance in fence service, fence value and fence life. Properly erected, a good fence will give you little trouble for a generation and more. Careless erection, however, can cause constant waste of time, labor and money through the years, no matter how good the fence. Improperly set posts, badly prepared ground, ill-fitting gates, loosely fastened wire, incorrect stretching—all these factors take their tolls in shortened fence life.

Poor fence erection is only a little easier than to do the job properly. Nothing much is saved in materials. Some little labor may be saved at the start, but that will be offset many times over in repairs later on. It takes no more wire to build a fence as it should be built. A little more time, perhaps, but surely worth it every bit. And when you are through you will have both a substantial fence and a sound investment that will go on paying dividends long after your perhaps less careful neighbor will have had to do his fencing job all over again.

PREPARING THE GROUND

After you have laid out your fence line, the first thing is to clear the ground of all rocks, stumps and irregularities. This is necessary to permit the bottom of the fence to come close to the ground, and on a level with it. It will also make the rest of the work considerably easier and quicker.

SETTING THE POSTS

In setting posts always take the location of gates (see Page 66) and the terminals of future temporary fence lines into consideration. Special bracing (see Page 58) is necessary for gate and terminal posts. Posts are the backbone of your fence. They must be well chosen, properly spaced and firmly set to enable you to get out of the fence fabric all the long life that has been built into it by its maker.

Line posts: Line posts for the average field enclosure should be equally spaced from 12 to 16 feet apart all along the fence line. For barnyard and other such hard-service enclosures, 10-foot spacing is better.

If you are using anchored steel posts they can usually be set firmly enough with an ordinary post driver. To set wood posts dig the holes 2½ to 3 feet deep with a post-hole digger, allowing enough spare room all around for packing in and firmly tamping down dirt and rocks around the post. Be sure wood posts are treated to prevent decay.

Posts set in hollows: Wherever it may not be practical to level off the ground completely special care must be taken with posts set in hollows; otherwise they may be loosened and eventually pulled out by the tension of the fence wire under stretching and temperature changes. The best method of anchoring such posts—either steel or wood—is to set them firmly in tapered concrete footings at least 3 feet deep and 1 foot square at the top (see Figures 1 and 2). For concrete mixing directions see Page 59.

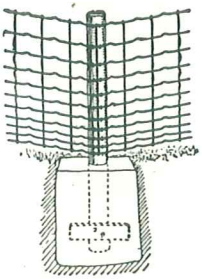


Figure 1

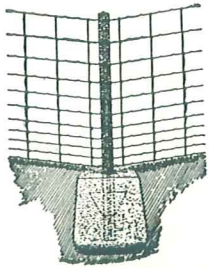


Figure 2

If for any reason concrete is not available the next best method of bracing is that indicated in Figure 3. Note particularly the wooden anchors spiked to the bottom of the post to assist in bracing.

Bracing line posts: About every 40 or 50 rods in a long fence line, even on level ground, it is well to brace a line post either by setting it in concrete or by bracing as illustrated in Figure 3. This will provide a steadier fence line by compensating for possibly insecure posts elsewhere along the line. In case temporary fence lines (see Page 63) are to be run from points along the permanent fence, such bracing will also provide proper terminals for the temporary lines.

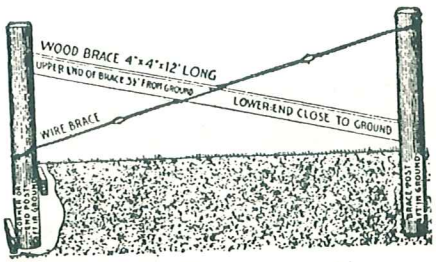


Figure 3

End, corner and gate posts: Extra heavy posts are necessary at ends, corners and gates to provide for the extra stresses at these points. In addition such posts should also be well braced.

Steel end, corner and gate posts are regularly furnished with special braces. The entire post, including braces, should be set in concrete footings as illustrated in Figure 4. The softer the ground the larger should be the concrete footings. In any case make these footings at least 3 feet deep and 20 to 24 inches square.

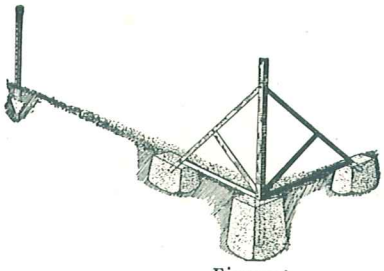


Figure 4

If you are using wood posts at corners, set them also in concrete and provide concrete-set post bracing, rigged up tightly as in Figure 5. Wood posts at ends or gates should also be set in concrete and connected to single bracing posts set about 11 feet from the main post, as in Figure 3. In installing these braces first twist the brace wire tight, then spike the brace-bar securely to each post. Be sure all wood posts are treated to prevent decay. Concrete alone is not sufficient.

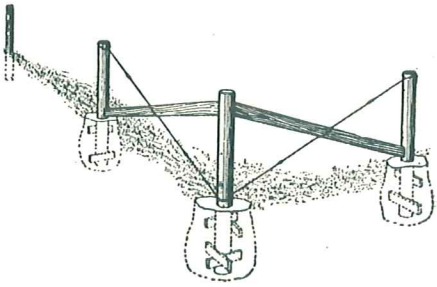


Figure 5

CONCRETE MIX

A good mixture of concrete for post anchors is:

1 part good cement

2 parts clean dry sand

4 parts clean crushed gravel

Mix all ingredients thoroughly while they are still dry, then wet with clean water and mix to a thick mush. Fill this into the hole solidly around each post, check the post for straightness and final alignment, then allow 3 to 5 days—depending upon the weather—for complete setting and drying before you begin to attach your fence.

POST ALIGNMENT

It is naturally very important that all posts in a fence line should be strictly in line with each other. Careless alignment will not only prevent proper stretching of the fence; it will distribute the burden

unequally among the posts as well, causing some to carry too much stress and others not enough. This will eventually mean pulled posts and a weakened, bad looking fence.

The best means of getting proper alignment is to take the precaution of stretching a straight cord between the two opposite ends of the proposed fence line, working closely to this guide both for depth of posts and for alignment. When all your posts have been set the outside face of every one in the line should just touch this plumb-cord. If they are steel posts, all of the same length, they should also line up level along their tops. This is especially necessary in the case of lawn fence erected with top rail (see Page 64).

STRETCHING THE FENCE

When all concrete is thoroughly dry and your posts are all solidly and evenly set you are ready to begin stretching fabric. Here, again, there are a few simple precautions which, properly observed, will make the job both easier and better:

Starting: Do not unroll your fence a whole roll at a time. Unroll only a little to begin with—just enough to give you sufficient working room to attach the end of the fence to the starting post. The best and most secure way to make this attachment is to remove the first 3 or 4 stay (upright) wires, then tie the long end of each line wire clear around the post (see Figure 6). Be careful to get the stays absolutely vertical before you do this tying or you will have trouble in stretching later on.

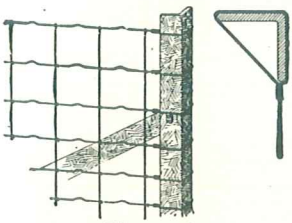


Figure 6

Now go ahead and unroll the rest of the fence, keeping the bottom as close to the line posts as you can (see Figure 7).

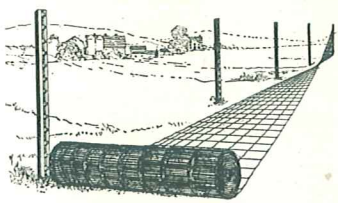


Figure 7

Splicing: To splice two sections of fence fabric, first pull both sections together (cut-ends of line wires overlapping) until the first stay wire in either section lies alongside the first stay wire in the other section. Now take the overlapping ends of the line wires (see Figure 8) and wrap them tightly together with pliers or a splicing tool. If the overlapping cut-ends of line wires on the fence sections to be spliced are not long enough for effective wrapping it may be necessary to cut out one stay.

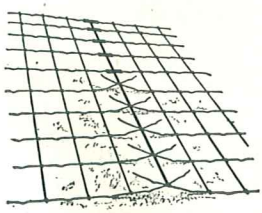


Figure 8

Always when you cut off a section of fence

fabric make the cut halfway between two stays to provide enough overhang on each cut-end for future splicing.

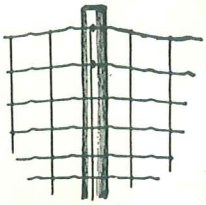


Figure 9

Preparation for stretching: Before you begin to stretch your fence you must of course pull it up to position against the posts. To keep it in position there drive a few staples about halfway in (wood posts) or loosely attach a few ties (steel posts) at intervals along the line (see Figure 9). This will allow the wire to slip easily, but it will prevent troublesome sagging and gaping during the stretching preliminaries.

Temporary stretching post: A temporary stretching post (see Figure 10) should always be set about 4 feet beyond the end, corner or gate post to which the fabric is to be stretched, and braced against this post as indicated in the illustration—to provide a solid foundation against the stress of stretching. Set the temporary stretching post about 3 feet deep and tamp down the earth solidly around it.

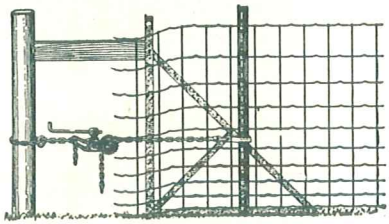


Figure 10

Stretching tools: It is necessary to have a jack-and-clamp-bar stretcher, either like the Pittsburgh Stretcher shown in Figure 10 or some other equally effective make. For low heights of fence —up to 32 inches—a single-jack stretcher is adequate. For stretching fences higher than 32 inches, however, and for all lawn fences, the double-jack stretcher (see Figure 11) is needed to distribute the pull evenly over the whole width of the fabric. Otherwise the fence may be distorted. A single-wire stretcher will also be needed to take up the slack between the jack stretcher-bar and the post (see Figure 11) around which the cut-ends of the stretched line wires are to be tied (just as was done at the starting post).

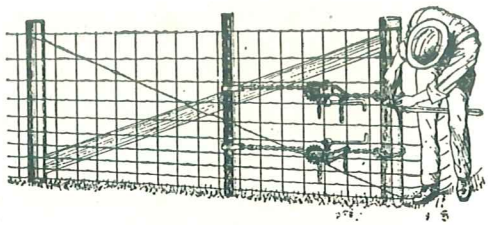


Figure 11

Actual stretching: In these directions for stretching we use Pittsburgh Stretchers as examples. If you are going to use some other make of stretcher the fundamental rules of good stretching practice will remain the same, but be careful to follow exactly the specific directions given you by the maker of the stretcher.

The clamp-bar of the Pittsburgh Stretcher is provided with adjustable lugs to hold the wires firmly under tension. Attach the clamp-bar far enough back on the fabric (see Figure 10) so that all slack will be taken up before the bar reaches the post. Set the bar in the center of the mesh, equi-distant between the two stays all the way down the width of the fence. This is important, for it will enable you to see at a glance during stretching whether any line wire is slipping.

To prevent slipping and possible injury to the galvanizing, pull the lugs of the clamp-bar as tight as you can possibly get them. Damage to the fabric may result if any lugs are insecurely fastened.

Now attach the jack (or jacks) to the clamp-bar. If you are using only a single-jack stretcher, be sure to attach the jack as nearly as possible so that an equal number of line wires will be above and below it (see Figure 10). Note particularly that this may not necessarily mean the actual center of the fabric width. If you are using a double-jack stretcher, space the jacks as nearly as possible so that an equal number of line wires will be above and below each jack (see Figure 11).

To attach the jack, loop the chain provided (see Figure 10) around the temporary stretching post and hook the jack-bar up close to it. Then hook the long chain to the stretcher clamp-bar sleeve, slipping the other end of the chain over the jack-gear wheel. Keep the chain straight. Now turn the jack handle to start stretching. The powerful worm and gear action of the jack quickly and easily brings the fence to the proper tension and holds firmly at any position without hooks, ratchets or locks of any kind.

If you are using the double-jack stretcher, be sure to keep both jacks at equal tension to avoid one-sided stretching.

During stretching it is well to keep watch all along the fence line to make sure the fabric is not caught on any snags or rocks.

Do not be afraid to stretch the fence up good and tight. As long as the tension curves are not pulled out—which is quite improbable —the tighter you stretch the better. The important thing is to keep the lugs on the clamp-bar so tight the wires cannot slip.

FINISHING THE FENCE

With the stretcher held at taut position go along the fence line and staple the fabric securely to every line post (or, if you are using steel posts, fasten the clips provided). Your fence line is now complete except for the final stretching of the short end-section of fabric between the stretcher clamp-bar and the terminal post. This stretching must now be done with a single-wire stretcher (see Figure 11). With the jack stretcher still held at taut position, cut the fence far enough *outside* the terminal post to allow plenty of

tying space at the cut-ends after stays are removed as at the starting post. Now, beginning at the top line wire, attach the single-wire stretcher, pull up the slack as tightly as possible and hold the wire taut while the loose end is wrapped all the way around the post and securely fastened at the inside center-line of the post (see Figure 11). Repeat this stretching and tying operation with each line wire, taking care to get them all evenly stretched. When you have finished—remove the jack stretcher and that particular fence line is finished.

Stretching at corners: Fence should never be stretched around a corner. Always stretch *to* the corner post as indicated above and tie the fence; then begin all over again for the next section. In some cases (as with lawn fence, for instance) where for reasons of appearance you may not want to cut your fabric at corner posts, it might be satisfactory to set the stretcher clamp-bar past the post and stretch the fence to a point beween the temporary post and the permanent corner post. If you do this, by all means securely fasten each line wire to the corner post in such a way that it cannot slip when stretcher tension is relieved. In actual practice, however, except with special tension bars such as are used for lawn fence, it is very difficult to get such a tight tie without throwing undue stress upon the stays and joints at tying points. It is advisable in erecting field fence, therefore, to treat each straight line as an entirely separate fence in stretching.

TEMPORARY FENCE

The erection of temporary fence for hogging down corn, temporary pasturage or any other activity of the modern farm is not so very different from the erection of permanent lines. Line posts —except for the first two or three at each end of the line—may be set ordinarily about twice as far apart (25 or 30 feet) as you would set posts for permanent fence. This depends upon the length of time the temporary fence will have to stand and upon the kind of stock to be enclosed. If the service is to be very heavy it is best to stick to the regular 16-foot spacing.

Always brace your terminals (see Page 58) as you would for permanent fence. This is necessary because you will have to stretch your temporary fence just about as tightly as you would permanent fence; otherwise it will be hard to handle when you are ready to take it down and put it up again. Uneven stretching or unevenly maintained tension on the fence will distort it and cause trouble later on.

In fact, except for the latitude allowed in temporary fence line post spacing, about the only differences between erecting permanent fence and erecting temporary fence are that you don't cut the

temporary fence off at terminals and you don't have to staple it or fasten it to the line posts so securely. In every other respect the directions already given for permanent fence erection apply just as well to the temporary fence erection. Your temporary fence has to be well erected if it is going to do an efficient job and still be in good shape for re-use.

Don't forget, in planning your permanent fence line, to take future temporary fence lines into consideration as much as possible, and to provide terminal posts for them as part of your regular fence line bracing-post system (see Page 58).

HOW TO ERECT LAWN FENCE

Except in certain details which will be described, lawn fence is put up just about like field fence. Special care, however, is necessary, since much of the good looks of the finished lawn fence depends upon careful erection.

Before you start to erect lawn fence we suggest a careful reading of the preceding instructions for erecting farm fence in order to check for details not fully discussed in the following short summary.

Setting posts: Special care is necessary in lining up lawn fence posts, particularly if there is to be a top rail on the fence. Exact height is doubly important because of the ornamental ball post tops. Otherwise the details of post setting are about the same as for farm fence, except that 10-foot spacing of line posts is better than the wider spacing recommended for field enclosures. For permanence the line posts should be set in concrete—just like terminal posts—if this is at all possible. Where there is to be a top rail these end, corner and gate posts must also be set with their tops 4 inches higher than the line posts to take the top rail end-clamp fittings (see Figure 12).

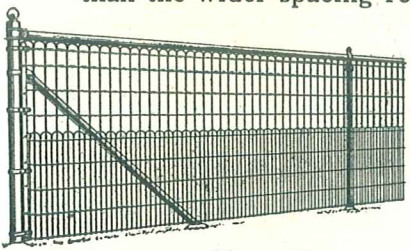


Figure 12

Top rail: Top rail sleeves and special post-top fittings are available with tubular top rail. Installation is accomplished as indicated in Figure 12. Complete all framework before you begin to stretch the fence.

Starting lawn fence: Figures 12 and 13 show two methods of attaching lawn fence to the starting post. We recommend the method shown in Figure 12 because it is neater looking and much easier to manage. Simply slip the two tension bars over the fence (see Figure 14), and clamp them firmly close to the post. Now put

the tension bar bands around the post and bolt them firmly over the tension bars (see Figure 15). These bands should be spaced not more than 16 inches apart—or closer, according to how many it takes to space evenly over the height of the fence.

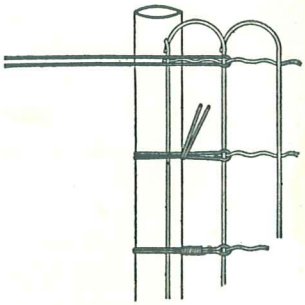


Figure 13

The alternative method of attaching lawn fence to terminal posts is not so satisfactory, but perhaps more economical. Take pieces of galvanized wire, about No. 11 gauge and 36 inches long. Bend them into sharp "hairpin" loops (see Figure 13) and hook one of these loops over each line wire, just past the upright stay. Bring both ends completely around the post and tie them back firmly as indicated in the illustration.

Stretching lawn fence: A double-jack stretcher (see Figures 14 and 15) is most satisfactory for stretching lawn fence, which has to be pulled so thoroughly and evenly taut that a single-jack or any light stretcher cannot do the job.

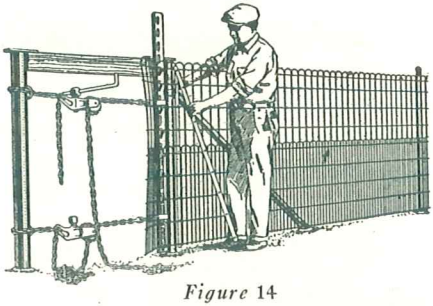


Figure 14

The actual stretching of lawn fence is done just as in the case of farm fence — *except in one important particular:* lawn fence may be stretched to a point *past* the terminal post (see Figures 14 and 15), since it does not have to be cut for tying. Set up your temporary stretching post just as you would for farm fence, but clamp your stretcher bar on the fence between this post and the terminal post instead of between the terminal post and the last line post as you would in stretching farm fence.

After you have stretched the fence as evenly and as tightly as it will come up without pulling out the tension curves, fasten it to the terminal post just as you fastened it at the starting post, then stretch the next section in the same way. Never stretch around a corner. Treat each straight line as a separate section.

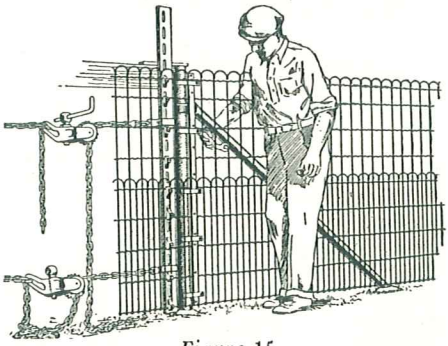


Figure 15

Stretching in close quarters: In some thickly populated metropolitan districts it may be impractical, because of restricting buildings, property lines, etc., to set a temporary stretching post beyond an end post. In such cases the best practice is to stretch the fence from each end toward the middle. That is, attach the end of the fence to the end post, put the temporary stretching post just beyond the center post, then stretch the fence section just as indicated in the preceding paragraphs. Fasten it securely to the center post and cut off the unstretched section. Then repeat the operation with the second section of fence, moving the temporary stretching post to the other side of the center post, stretching the fence and fastening it as before. Then trim off the loose ends of both sections at the center post and the fence is finished (see Figure 16).

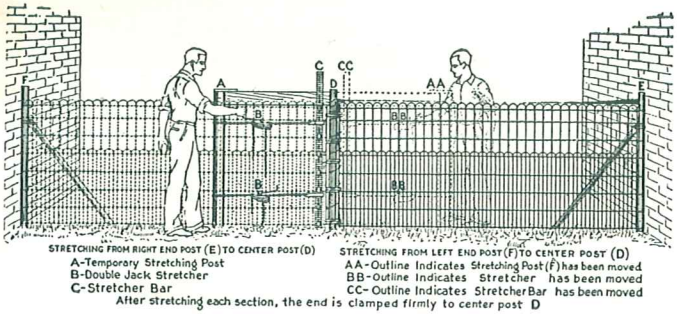


Figure 16

CHAIN LINK FENCE

In the erection of chain link lawn, estate or industrial fence the only important variation from ordinary lawn fence practice is this: chain link fence should be stretched *from both ends toward the middle.* This eliminates the temporary stretching post. It is possible because of the ease with which the two ends, after stretching, can be perfectly spliced merely by the simple insertion of a spiral connecting link (see Figure 17), which leaves no trace of the splice.

Figure 17

This is the same feature which makes it easy to repair any chain link fence damaged by accident without leaving any trace whatever of repairs.

HOW TO HANG GATES

Posts: All gate posts in a fence line should of course be set and braced as if they were end posts—which, in fact, they are.

In order to get a definite idea of position before your gate posts are actually set it is a good plan always to hang the gate on the posts just after your post holes are dug, and before they are filled

in. In this way you can make your adjustments while there is still time for changes if they should prove necessary. When you have made these adjustments, and have gotten the gate into just the right position, brace gate and posts somewhat as in Figure 18, supporting the gate from beneath with blocks. Leave it supported there, at least until your post holes are filled and the concrete has begun to set to such an extent that the gate can be carefully removed without further fear that the posts will be disturbed.

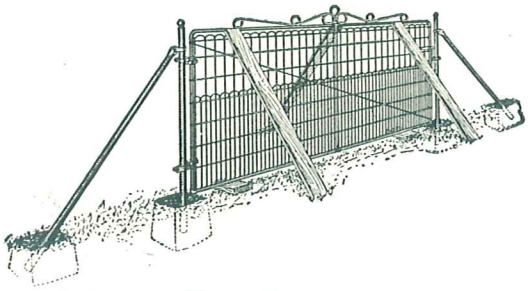


Figure 18

Another way of providing for the proper distance between gate posts is to get the "width of opening" from the manufacturer's catalogue, cut two straight boards to the exact length of this distance and use these to brace the posts correctly apart in their open holes (see Figure 19). The twisted wire brace will hold the spacer-boards well in place against the two posts. Now fill the post holes and leave everything as it is until the concrete is thoroughly set. This latter plan is favored by some because it eliminates the necessity for handling and propping the gate, and because it also avoids the possibility of accidentally moving the posts before the concrete is thoroughly set. When everything is ready all that remains is to attach the fittings and swing the gate into place.

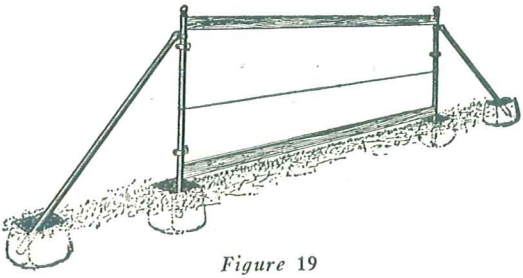


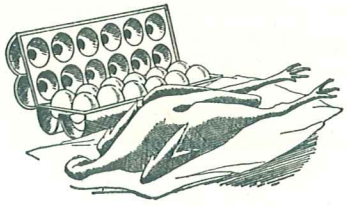
Figure 19

FENCE TOOLS AND ERECTION MATERIALS

All necessary stretchers, splicers, fence staples, posts and concrete—together with any special attachment fittings you may require—are available through the dealer from whom you bought your fence. Meanwhile if you have any special erection problems that may call for assistance, feel perfectly free either to call on this dealer or to write to us direct without obligation of any sort.

PART FIVE

MODERN POULTRY MANAGEMENT



THE old more-or-less haphazard methods of poultry raising have come in for a great deal of revision lately as organized experiments have progressed in the direction of more certain knowledge about the causes, preventions and cures of poultry diseases.

Much has been learned, for instance, about the dread Coccidiosis, the ravages of which have in the past probably sent many poultrymen to the edge of failure and some over the brink altogether. Now, thanks to the new knowledge gained from the steadily progressing experiments of poultry authorities throughout the country, Coccidiosis is controllable. Its dangers need no longer deter the ambitious poultry raiser who recognizes the splendid profit opportunities in poultry, either as a main business or as a logical source of welcome extra income at home or on the farm.

The raising of turkeys especially used to be considered highly difficult, nearly always involving such heavy mortality that market prices were driven to almost prohibitive levels. Now, by the same control methods which have proved such a boon to chicken raisers, the turkey death rate has been cut until these birds are often considered as easy to raise as any poultry.

The following brief discussion of the more important phases of this Modern Poultry Management is not intended to give a complete or comprehensive description of methods, but simply to indicate what is being done by many up-to-date poultrymen, and to suggest ideas which will be of equal value both to the professional poultry rancher and to the "back yard" amateur. For detailed information and instructions about putting these ideas into effect we refer you to your State Agricultural Experiment Station.

POULTRY SANITATION

"Sanitation" is one of the key words of the whole new idea in poultry management. Guard your poultry against dirty quarters and

infested range and the greatest part of your troubles are over. Clean birds, kept in clean surroundings, are not only in little danger of contracting most infectious diseases, but they will be generally fatter and more profitable producers as well. Because they will be in better condition to make the fullest use of the feed they are given they will be economical to keep. Because their eggs will grade better they will enable you to get more money for their output. Because they will be healthy they will give you more choice meat for the market, and they will transmit their qualities to the entire strain. In contrast to the experiences of poultrymen who have been plagued year after year with the heavy losses from parasites and disease that make profits exceedingly difficult in any market, this picture seems almost too good to be true. Many of those who have experienced the new method's benefits, however, would almost sooner give up poultry altogether than go back to the old gambling which seldom ever gave full potential returns on any poultry investment.

Insuring poultry sanitation: The first step in any sanitation program is of course a thorough disinfection. If your flocks appear to be infected with any disease a careful culling is first in order. After this the infected poultry must be quarantined and the healthy ones moved either to fresh enclosed ground or to previously prepared special quarters, perhaps fitted out with wire floors, sun porches and other facilities of confinement-management which will be discussed a little later.

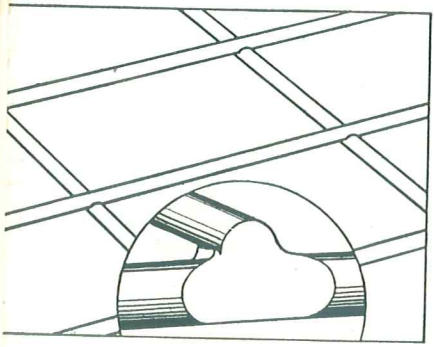
This separation of the poorly conditioned and diseased birds from the healthy ones accomplished, the next thing is to clean and disinfect polluted grounds and quarters for a fresh start. Thereafter it is mostly a matter of frequent cleaning and disinfection of all feeding and drinking utensils, periodic removal and burning of all litter and rigid maintenance of cleanliness in all places where poultry is kept. If the range system of management is followed, two or more separate enclosures should be provided to permit changing flocks back and forth to clean ground at frequent intervals. In addition, wherever possible the range should be plowed and cropped every year to afford further control of infectious organisms.

Always keep chicks away from older birds. Brood them in portable brooder houses which can be moved entirely away from the poultry yard, and keep them off ground where older birds have run. Newly hatched chicks are usually healthy chicks. Your best chance of raising them in continued health lies in keeping them uncontaminated. Do this, feed them properly and see that their quarters are well ventilated and you will probably have little need for much knowledge about treatment of poultry diseases. "An ounce of prevention . . ."

WIRE FABRICS AS AN AID IN POULTRY MANAGEMENT

The development of special welded wire fabrics for poultry usage has been one of the chief aids to modern progress in poultry husbandry. The need for wire poultry fence in range management of poultry has long been obvious, both as a means of simple confinement and as an instrument through which scientific changes of fresh range may be most easily accomplished. Little need be said, therefore, about good poultry fence as one of the chief necessities of poultry raising. Welded wire poultry fabrics, however, are perhaps not yet so well known to the public generally as their importance merits.

Quite aside from considerations of general-purpose enclosure fencing, for which the standard hinge-joint and electric-welded poultry fences and woven nettings are available, special welded wire fabrics are adapted specifically for such tools of the modern poultryman as wire floors, broiler and laying batteries, sun porches and feeding fences.



Illustrating the permanent, solid joint achieved by proper electric welding.

These fabrics are no new thing. More than 35 years ago Pittsburgh Steel Company pioneered in electric welding of stiff-stay fence. Long ago perfected, this welding process turns out material whose joints are perfectly smooth and inseparably welded together for great strength. Applied to special-mesh poultry fabrics this means that the material can be readily cut without possibility of leaving loosened joints, that it will support weights (brooder stoves, for instance) easily, that it will last almost indefinitely and that it cannot scratch or otherwise injure poultry. The mesh will not spread or tear. In every way it meets the requirements for an economical, efficient and long-lasting material that is easily installed, easily cleaned and thoroughly fitted to the poultryman's diversified needs.

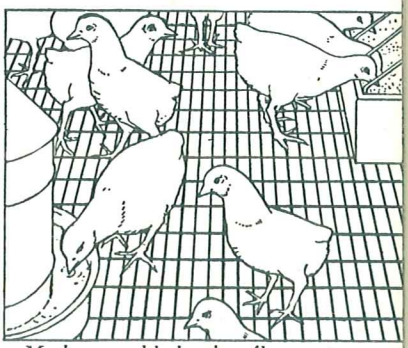
In the following paragraphs will be discussed some of the specific applications to which these welded wire fabrics are adapted, and some of the reasons why these applications are coming into general use in the poultry industry.

WIRE FLOORS

The chief claim to fame of the wire poultry floor is the practical cleanliness it permits, minimizing danger of spreading infection

among your flocks through disease germs in droppings. The open mesh of such a floor not only offers little lodging for droppings, but it is extremely easy to clean as well.

Chickens kept on wire floors are also freed from the dangers of eating contaminated litter, and of picking among droppings or in wet places around drinking vessels. Naturally this means greatly reduced exposure to disease possibilities. Coupled with a real saving in labor—a saving which in itself will probably pay over and over again for the small cost of installing wire floors—the idea presents such interesting possibilities that most poultrymen will want at least to investigate fully.



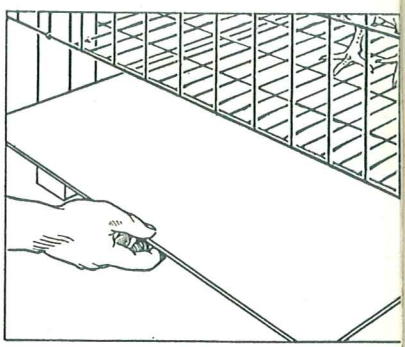
Modern welded wire floors prevent contamination through easily maintained sanitation.

Those most familiar with the subject of welded wire poultry floors recommend fairly wide mesh material (see Page 76), for even comparatively small chicks will soon learn to handle themselves on it with ease. The wider the mesh the more economical and the more sanitary it will be.

In the case of very small chicks some poultrymen use the mesh which will be suitable for them after they have had a chance to grow a little, covering this mesh with ordinary hardware cloth at first. This hardware cloth is then removed when the chicks learn to handle themselves on the standard welded-wire permanent floor.

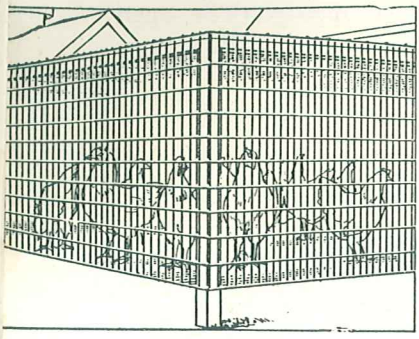
Wire floors can be used almost anywhere to advantage—in brooder houses, under roosts, for outside range, sun porches or poultry batteries. They are easy to install because they are strong enough to require little support.

When you put in your wire floors be sure to get them high enough that you can keep them cleaned out underneath. Dropping boards or sheets of heavy paper placed under each floor in such a way that they can be easily slid out will reduce cleaning work and time to a minimum.



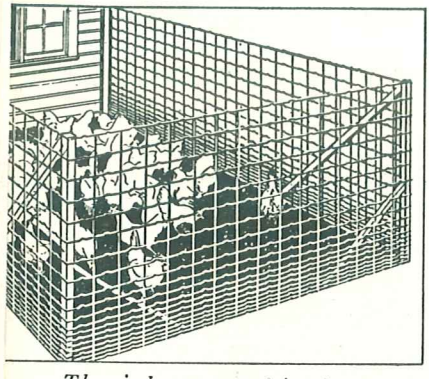
Droppings are easily kept cleaned out with the help of this simple arrangement.

Do not expect wire floors to eliminate all your poultry troubles. They cannot do that. What they can do, however, is to make poultry sanitation easy to maintain. That means simplification of your whole poultry problem.



Safe, convenient and sanitary—the wire sun porch is a great boon to poultrymen.

Clean feed, untouched by droppings—and unwasted by scattering.



The cinder sun yard is often a good substitute for wire-floored sun porches.

Sun porches: A wire-floored, wire-enclosed portable sun porch in connection with the poultry house will give your birds the advantages of fresh air and direct sunshine without the disadvantages of exposure to disease and parasite infection. With sun porches, maintenance of sanitation is also much easier than on range.

The floor of your sun porch should be just about the same as any other welded wire poultry floor, its mesh depending upon the size of the birds using it. Porch tops and sides may be either suitable styles of welded wire fabric or poultry netting, depending mainly upon the length of service desired. Where feed troughs are to be hung outside, a special-mesh welded wire feeding fence will probably be more satisfactory and economical for the porch sides. Netting may often be used for tops, however, particularly if they are not likely to be called upon to support any weight (shade and rain covers).

An additional important advantage of the sun porch is that it always enables you to keep more birds in any one poultry house, since it offers them more overflow room.

It may be worthwhile here to call your attention to the next best substitute for the wire sun porch, which, although it is inexpensive, may not for some individual reason be practicable to install at once for all your poultry.*

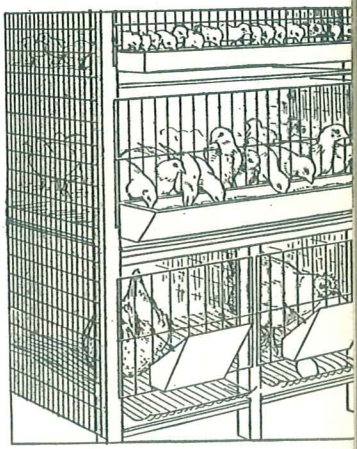
Cinder sun yards: The cinder-covered sun yard is aimed at somewhat the same results accomplished by the wire sun porch except that its sanitation is of course not so easily controllable. For best results two yards should be provided for each house—one on the south side (for winter) and one on the north side (for summer). If only one yard is possible the east side of the house is preferable. The idea of having two yards is to

**The purpose of this Book is not to make arbitrary recommendations, but to set forth as clearly and briefly as possible a report of authoritative opinion.*

provide facilities for frequent changes, as with double-range in order to lessen contamination possibilities. Some authorities recommend 3 yards for use in a 3-year planned rotation system.

These cinder sun yards need not be much larger than is necessary to provide room for the poultry to move about fairly freely, although where larger space is possible the concentration of droppings, and therefore of contamination, will be lessened. As a general average the cinder yard space may be perhaps a little larger than the floor space inside the poultry house.

The yards should be enclosed to prevent segregated groups of birds from mingling together, and covered with a fairly thick (8″-10″) layer of coarse cinders to provide better filtration of moisture and contamination than the ground affords. In winter, too, snow will melt more quickly on cinders than on the ground, giving chickens better opportunity to get out of their houses and into the open air and sun.



Combination batteries, accommodating all sizes of poultry, help solve many poultry problems.

POULTRY BATTERIES

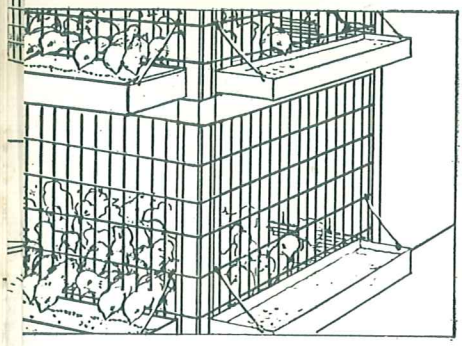
It is only comparatively recently that the possibilities of confinement-raising of poultry in individual or group starting, developing and laying batteries have been receiving serious attention among poultrymen. Experiment stations have for some years been exploring these possibilities, but general interest in the subject has just fairly begun to take hold. Meanwhile so much of probable value appears in the experiments already conducted that it seems very much worthwhile to outline their results generally here.

The use of poultry batteries has three chief objectives. The first is sanitation, as in the case of wire floors, but reduced to even more detailed control. The second is segregation for more effective keeping and checking of individual poultry records. The third is more efficient utilization of space.

Unlike humans, chickens do not seem to suffer from lack of outdoor exercise, provided their ration is properly balanced and provided ventilation is good. It thus becomes possible to keep large numbers of them within very limited floor areas through the use of confining batteries which utilize several times more air space than ground space. Even the city dweller can, by using batteries, raise chickens in his own basement, no matter whether yard space is available or not. One experiment, during which chickens lived altogether in batteries for more than 5 years, showed continued good egg production, strong-shelled eggs, less mortality than on range and gen-

erally contented birds throughout the period—a fair indication that with proper ration and reasonable care poultry can be successfully raised in close confinement.

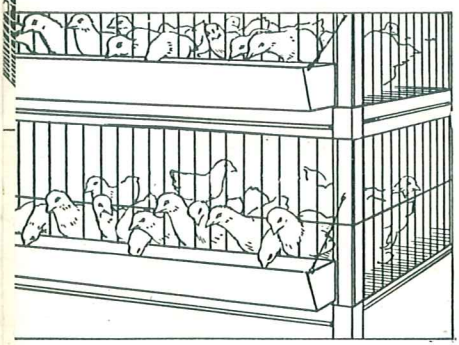
Some poultrymen have used batteries exclusively, brooding their chicks in starting batteries, transferring them later to developing or broiler batteries, then finally to laying batteries. In this way each battery or group of batteries can be made for the specific requirements of the poultry to be confined, with consequent economies in utilization of all available space in the batteries regardless of the size of the chicks, poults, pullets or layers.



Maximum use of minimum space. The starting battery has much to recommend it.

There are also available combination batteries, arranged to provide separate decks or tiers for birds of different sizes. Or you can easily make a battery of your own including this feature.

Starting batteries: Starting batteries are usually used to confine newly hatched chicks until their sex can be determined and separation of cockerels from pullets effected. The chief advantages of this method of management seem to be that such vital factors as sanitation, temperature, humidity and ventilation are more easily controlled in batteries, and that costs are lowered through reduced mortality and reduced feed waste. Certainly space is saved, and the probabilities are that less labor is necessary to care for battery chicks properly. The chief things to guard against are the common vices, which are perhaps more apt to be prevalent in battery-brooded chicks unless they are kept in comparative darkness. On the other hand disease control in battery brooders is obviously more practical than in brooder houses and the fact that poultry production through the use of confinement methods is taken out of the category of seasonal business certainly makes the idea worth at least a great deal of serious consideration.

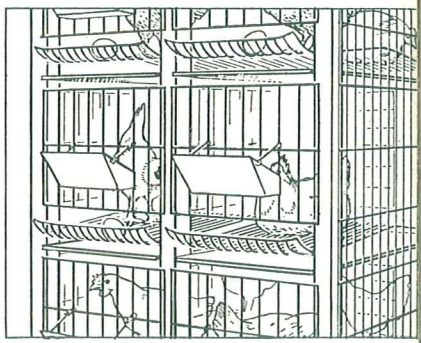


Developing batteries afford excellent opportunities for special market preparation and care.

Developing batteries: As soon as pullets and cockerels have been separated in the starting batteries, usual battery practice is to put the pullets into developing batteries both as a means of continued general control and as a means of keeping an eye on each bird in order that the best laying and breeding stock can be selected

for later transfer to individual laying batteries. Meanwhile the cockerels are fattened off in the developing batteries for sale as broilers after a few weeks.

Battery-grown broilers are undoubtedly better finished for market than range birds. They are tenderer and more evenly meated. As against this, however, they do not seem to be able to stand live shipment for much of any distance (this is a fault which, as battery-raised birds grow older, they largely overcome). In any event, battery development seems so advantageous from most practical standpoints—not the least among which is, again, lengthening of the market season—that it seems very likely indeed to become standard practice on poultry farms of appreciable commercial importance.



Individual egg records alone are worth a great deal to the serious poultryman.

Laying batteries: Individual laying cages arranged in batteries not only provide opportunity for the effective control of disease and mortality so necessary in all modern poultry management, but they afford an efficient means of accurate individual production recording as well. What this means in reduced general costs through elimination of unprofitable layers and in increased profits through more uniformly marketable eggs may well be imagined. Reduced feed costs, sometimes estimated as high as 10 pounds of feed saved per bird per year, also offer room for economies that may well pay for much of the initial cost of some of the modernization indicated by the new poultry methods.

SUMMARY

It has been difficult in this discussion of some of the new developments in poultry management to differentiate between the experimental and the proved. Strict confinement in batteries especially is such a comparatively recent development that only the most optimistic can say flatly that this is unqualifiedly the best system for every poultryman. At the present stage of development the most that can honestly be said is that the large poultry plant seems definitely to need one or more types of batteries, and that the small poultryman should at least make a thorough study of the whole idea, always keeping in mind his own specific needs and fitting the results of his open-minded fact-finding into the pattern of his general farming scheme of things.

As for wire floors and sun porches: on the basis of more complete

experience gained from much past research of their possibilities in sanitation and disease control, we can very definitely recommend these facilities, which have shown themselves to be of great value at comparatively little cost in almost every kind and degree of poultry activity on both large scale and small. Regardless of what is now known definitely about strict confinement-management, it is a settled fact that the sanitation rendered so easily possible with wire floors and sun porches is a highly important factor in poultry profits to every flock owner.

WELDED AND MISCELLANEOUS† WIRE FABRICS

Poultrymen's Table of Uses

	Wire Floors		Poultry Batteries	
	Inside Poultry Houses, Batteries, Roosts, etc.	Outside Sun Porches, Range Shelters, etc.	Fronts & Sides (Also see "Wire Floors—Inside")	Partitions (Also see "Wire Floors—Inside")
Chicks	Gauge Mesh *12½—2"x1" *14 —2"x1" 15 —⅝" H. C.††	Gauge Mesh *12½—2"x1" *14 —2"x1" 15 —⅝" H. C. ††	Gauge Mesh 11 —4"x1" 12½—2"x1" 14 —2"x1"	Gauge Mesh 14—2"x1" 14—1" H. C.†† 16—1" H. N.††
Broilers	*12½—2"x1" *14 —2"x1" 16 —1" H. N.††	*12½—2"x1" *14 —2"x1" 16 —1" H. N.††	11— 6"x1⅜" 9—12"x1⅜" 11—12"x1⅜"	14—2"x1" 14—1" H. C.†† 16—1" H. N.††
Hens	12½—2"x1" 11 —4"x1" 14 —2" H. N.††	12½—2"x1" 11 —4"x1" 14 —2" H. N.††	11— 6"x1⅞" 9—12"x1⅞" 11—12"x1⅞"	14—2"x1" 14—1" H. C.†† 16—1" H. N.††

	Sun Porches		Feeding Fence
	Fronts & Sides (Also see "Wire Floors—Outside")	Tops	
Chicks	Gauge Mesh 11 —4"x1" 12½—2"x1" 14 —2"x1"	Gauge Mesh 14—2" H. N.†† 14—2"x1"	Gauge Mesh
Broilers	11 — 6"x1⅜" 9 —12"x1⅜" 11 —12"x1⅜"	14—2" H. N.†† 14—2"x1"	11— 6"x1⅜" 9—12"x1⅜" 11—12"x1⅜"
Hens	11 — 6"x1⅞" 9 —12"x1⅞" 11 —12"x1⅞"	14—2" H. N.†† 11—4"x1" 14—2"x1"	11— 6"x1⅞" 9—12"x1⅞" 11—12"x1⅞"

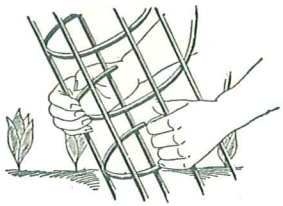
†*Pittsburgh Steel Company does not make such materials as Hardware Cloth and Netting, for instance. Wherever we recommend these non-welded fabrics we do so in order to provide economical alternatives which, although they cannot be expected to last as long as welded wire materials, may quite well serve in many individual circumstances.*

**Poults handle themselves satisfactorily after about 3 weeks on floors of 2"x1" mesh. For chicks and very young poults a desirable plan is to have permanent wire floors of 2"x1" mesh welded wire, covering this floor for the first four weeks with ordinary hardware cloth. This practice both permits earliest use of more open mesh material for greater sanitation and makes one size of welded wire fabric do double duty—often a welcome further economy.*

††*H.C. = Hardware Cloth. H. N. = Hexagon Netting.*

PART SIX

MISCELLANEOUS USES FOR WELDED FENCE FABRICS



THE history of electric-welded fence offers an interesting sidelight on the progress of the Fence Industry. More than 35 years ago Pittsburgh Steel Company successfully pioneered the electric-welding of fence joints for stiff-stay fence. Some will remember the hot controversy that raged for years between the supporters of the then new electric-welded stiff-stay fence on the one side and the familiar staple-tie fence on the other.

We need not be concerned here with the details of these controversies. They have produced their own answer, for as soon as our last patents recently expired competing manufacturers immediately began entering the field with their own brands of welded fence, demonstrating beyond question that the advantages of electric-welded fences have long since been established.

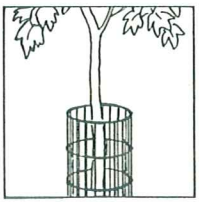
Meanwhile, however, an interesting development occurred—one which had hardly been taken into consideration when welded farm and lawn fences were first offered to the public. In addition to their regular fencing activities people began using these welded fence fabrics to make a wide variety of familiar objects in general usage, from dish drain racks to bear cages. Thus a whole field of new and useful jobs for welded wire fencing was opened up.

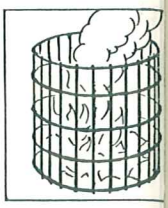
The reason lies largely in the smoothness, the exceptional strength and the lasting neatness of good welded-joint fence fabrics. Properly made, these fabrics offer such sturdy permanence that they are quite readily adaptable to a wide variety of other-than-fence applications, with consequent economies that can hardly fail to appeal to anyone who is in the least handy with simple tools. Often no more than a pair of pliers and a few minutes' time are needed to turn a few cents worth of welded fence fabric into an article of general utility that will serve handily for years to come.

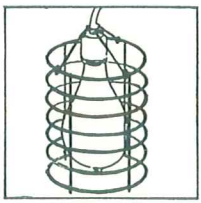
The following lists of suggestions are by no means complete, but they will serve to remind you probably of other convenient ways in which these versatile and inexpensive materials can be made to meet

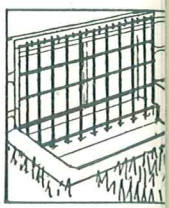
your own needs. A catalogue illustrating and describing in detail the fabrics referred to, together with all other Pittsburgh stiff-stay and hinge-joint farm and poultry fences and Pittsburgh Lawn Fences, will be sent free upon request. If your dealer does not have one, please write direct to Pittsburgh Steel Company, Pittsburgh, Pennsylvania.

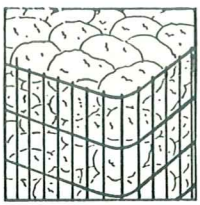
Uses in and around the home: Your first thought of lawn fence is naturally to use it as an actual protective enclosure for your yard, or as the base for a modern Fence Garden.* There are almost countless other ways, however, in which a good electric-welded lawn fence (see Page 110) can perform useful services around the household, indoors and out, and inexpensively, too. You can take a little of it for instance and easily fashion portable guards to keep dogs, cats and rabbits away from trees and shrubbery. Flower supports and trellis are just as simple to make.

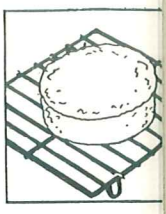












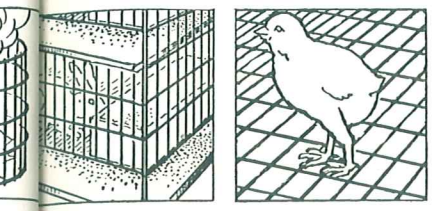
Inside the house a dish drain is always a welcome kitchen feature; or an airy fruit and vegetable bin; or perhaps even an indoor aviary. The list of possibilities is almost limitless. And remember this when you are choosing the size and mesh of Pittsburgh welded wire fence fabric to suit your needs: you can use it pretty roughly without harming it much. Bend it as you please; the joints will hold. You may have occasion to use the same piece of material say for a peony support one week and a porch guard the next. It won't get temperamental at such treatment.

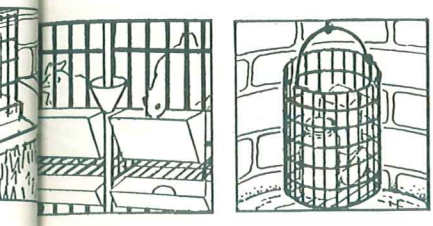
The following brief list of suggestions for general home use of Pittsburgh Welded Fence Fabrics is only a starter. You will think of many more:

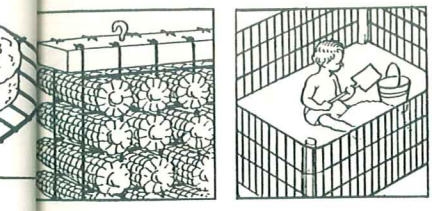
Animal Pens	Lawn Fence	Vegetable Bins
Garage Partitions	Bird Cages or Aviaries	Dish Drain Racks
Tree and Shrub Guards	Trellis	Flower Supports
Trash Burners	Cake Cooling Racks	Window Guards
Tennis Courts	Children's Play Pens	Porch Guards
Light Bulb Protectors	Flower Baskets	Outdoor Cooking Grills

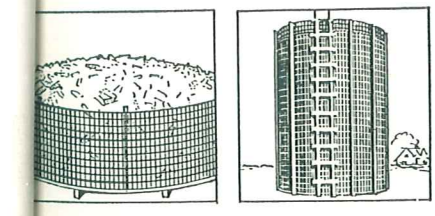
**A Fence Garden is a wall of climbing vines and flowers grown on a strong lawn fence foundation to act either as a screen for your "outdoor living room" or as a "hanging garden" in its own right. Write for the illustrated free Pittsburgh Fence Garden Booklet.*

Uses on the farm: Typical of the many interesting farm uses for welded-joint fence fabrics is the welded-wire temporary silo. It would be hard to say just who started this excellent idea. It may have been the Western farmer whose neighbors so well liked his own original silo (made of Pittsburgh Plain Lawn Fence fabric sections, joined together with hog rings, lined with ordinary building paper and put up on a skeleton framework of 2″ x 4″ timbers). At any rate these same home-made but thoroughly practical temporary silos soon began to dot the whole neighborhood and then to spread until hundreds of them are now in yearly use throughout the Corn Belt. Chief reasons for their popularity are their economy for temporary silage storing and the ease with which the fabric can be taken down and moved around, rolled and stored—or put to any variety of between-season uses around the farm until silo-filling time comes again. The smooth welded joints are easy on the paper silo lining and the rigid strength permits a neat job that will stay neat.









Corn cribs and seed corn drying racks are two more useful farm helps easily made from this fence.*

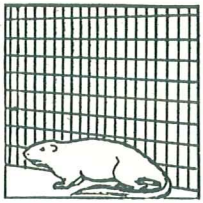
The extensive use of special welded fabrics in connection with poultry and turkey raising has already been discussed in Part 5 of this Book. Meanwhile the list below will undoubtedly suggest to you many additional ways of putting both these and the regular welded lawn fence materials to work on your farm:

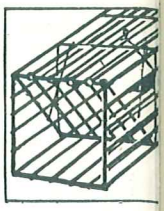
Anti-Burrow Mesh	Thatched Shelters
Laying Batteries	Storage Bins
Silos	Barn Partitions
Feeding Pens	Drying Racks
Plant Guards	Spring or Well Cooling Baskets
Mangers	Vine Supports
Corn Cribs	Sorting Tables
Poultry Floors	

Uses on the fur farm: Fencing is one of the really important problems in fur farming. Actual confinement of the fur-bearers is only a half-solution. A fence may do an excellent job of confinement and protection from outside dangers,

**Ask for a free Pittsburgh Silo and Corn Crib Circular.*

yet itself be a constant further source of danger through its probabilities of injury to animals and their coats by means of protruding rough-edged wraps or ties. Or, with the express purpose of eliminating this latter hazard, the fur farmer may erect a type of fence which is far too costly, either in first cost or in upkeep.

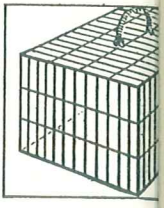




Good welded-joint fence fabric is certainly the logical solution of this problem. It has no wraps or ties, yet it is neither more expensive than ordinary wire fence nor so necessary to watch continually. The joints cannot be forced and the mesh cannot be spread.

In addition to the regular line of Pittsburgh Welded-Joint Fur Farming Fabrics* there are other special Pittsburgh welded fabrics from which to select styles and weights for such incidental uses about a fur farm as these:

Animal Cages	Shipping Crates
Feeding Pens or Racks	Gates
Guard Fence	Pens
Movable Pens	Catching Traps
Animal Runs	Carpeting Wire
Vermin Proof Fence	Repairing Work



Uses for the merchant:

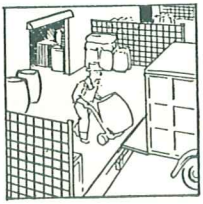
Open display that allows people to *see* the merchandise they are going to buy is an important feature of modern store management. Thus we find a lot of use for a neat looking, smooth welded-wire fabric around the general retail establishment.

It is much better to display fruit, for instance, in a wire fabric container (with board bottom, to prevent damage to fruit) that will permit customers to see all the way down than to dump the fruit into a box or leave it in barrels and crates. And it is much better for the fruit. The same thing applies with vegetables, and with a good many other things every retail store has on hand to sell. It is always well to have some wire display baskets and racks available. They are certain to come in handy. Customers like to see everything they can of what a store has to offer.

Another extraordinary use to which welded lawn fence fabric has been put is the making of advertising signs, both for store use and for outdoor advertising "boards." The usual method of doing this is to make or have made separate letters, securing them by means of wire fasteners or by any other

Ask for a free Fur Farming Fence Circular.

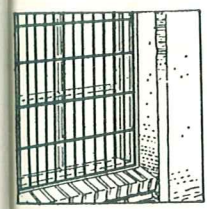
simple attachment method to a background of inconspicuous welded wire fabric. This idea is especially growing in popularity for billboards, since it largely eliminates objectionable defacement of the landscape, in addition to affording an unusually attractive looking sign which does not need the continual repainting of ordinary outdoor advertisements. Since such a sign does not block the wind it is also much less likely to be blown down than is the solid-panel billboard. This is an idea many farmers who market products at the farm can use to advantage.

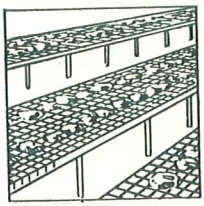


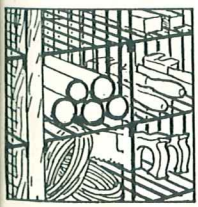
Uses for manufacturers:

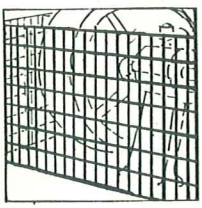
Manufacturing plants have discovered a host of uses for welded fence fabrics. A good many industrial concerns, having no need for the full heavy-duty service of the big industrial types of Pittsburgh Chain Link Fence usually used, have found that they can put up regular welded Pittsburgh Plain Lawn Fence and add barbed wire arms to make a light industrial fence in every way satisfactory for their special needs.*

But this is only a small part of the industrial use for welded-wire fence fabric. Excellent machinery guards are made from it. You can find it in many a tool room partition. It is made use of continually in cooling tables and racks. Stockroom bins will suggest its use both as a means of quick visual inventory and as the solution of the problem of sturdy but economical construction. It comes in handy for partitions in plant garages. It can be used to sort and grade sizes. And you can doubtless immediately think of a dozen or more ways beyond the following in which a strong, light, easily handled, rust-resistant welded wire mesh material can perform valuable industrial service:









Screening Fabric
Material Bins
Sample Exhibit Enclosures
Cooling Tables
Warehouse Floor Divisions
Plant Signs
Window and Light Guards
Process Immersion Racks
Toolroom Partitions
Shipping Platform Guards
Drying Equipment
Lavatory Divisions
Trash Burners
Machinery Guards
Chute Covering

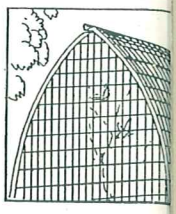
Uses in public works:

A sensible economy is very properly the working keynote of the responsi-

**Ask for a free Special Light Industrial Fence Circular.*

ble public official. Such economy has certainly shown itself to be a fine vehicle for the advent of welded fence fabrics into public projects of all varieties and classes.

Nearly every public park has some provision for swimming. Rather than "life ropes," which are easy for children to slip under, smooth-jointed, rust-resistant welded fence makes the ideal underwater depth guard. Many kinds of cages can be formed on the spot from this strong fabric. And the thought of recreation grounds suggests dozens of other ways in which it can be economically em ployed to protect and to facilitate proper public use of public facilities.

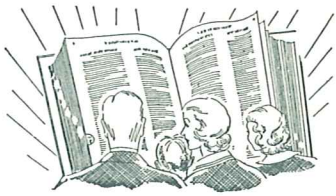


In a different field of public works we find bridges and other guard railings of these fabrics. Municipally planted and supervised trees, flowers and shubbery are often protected by special guards made from them. Fair grounds, with their midways and their race tracks, use quantities of welded fabrics for many varied needs. Even the city garbage plant finds them a welcome aid in the form of refuse collectors and burners. And many are the local jails in which this truly cosmopolitan product helps serve the public; for it has no false pride. It works well wherever there is a job for it to do.

For miscellaneous uses: Welded fence fabrics, you will have gathered, perform many unique services in many unique ways and in all sorts of places. We have attempted merely to indicate some of their most generally interesting uses in fields more or less familiar to us all. There are of course many other ways in which it may serve you individually. You have thought of some of them as you have looked over the suggestions already set down. Others will come to you as the needs arise. Meanwhile we are always glad to hear of new uses. Write and tell us about things you may originate or know about. We like to keep in close touch with the services our products perform.

PART SEVEN

MISCELLANEOUS INFORMATION AND RECORDS



While the information in the next 21 pages has been compiled from data we believe to be dependable, Pittsburgh Steel Company cannot vouch at first hand either for the completeness or for the strict accuracy of what follows. Gathered from many varied sources, the material in this particular chapter of the Book is necessarily offered more as a facility for handy general reference than as a guaranteed factual compilation.

ESTIMATED U. S. POPULATION 1936

The population of the United States by States on July 1, 1936, is estimated by distributing to each state the increase in the national population according to the percentage of that State's increase in relation to the national increase between 1920 and 1930.

U. S.	128,429,000	Ind.	3,459,000	Neb.	1,364,000	R. I.	681,000
Ala.	2,864,000	Iowa	2,543,000	Nev.	100,000	S. C.	1,860,000
Ariz.	406,000	Kans.	1,886,000	N. H.	508,000	S. Dak.	692,000
Ark.	2,023,000	Ky.	2,883,000	N. J.	4,328,000	Tenn.	2,864,000
Calif.	6,059,000	La.	2,122,000	N. Mex.	422,000	Texas	6,117,000
Colo.	1,066,000	Md.	1,674,000	N. Y.	12,935,000	Utah	516,000
Conn.	1,734,000	Me.	853,000	N. Car.	3,457,000	Vt.	380,000
Del.	259,000	Mass.	4,425,000	N. Dak.	703,000	Va.	2,671,000
Dist. of Col.	619,000	Mich.	4,783,000	Ohio	6,713,000	Wash.	1,643,000
Fla.	1,642,000	Minn.	2,635,000	Okla.	2,528,000	W. Va.	1,830,000
Ga.	3,060,000	Miss.	2,008,000	Ore.	1,017,000	Wis.	2,908,000
Idaho	485,000	Mo.	3,959,000	Pa.	10,136,000	Wyo.	233,000
Ill.	7,845,000	Mont.	531,000				

FARM POPULATION IN THE UNITED STATES

Over one and a third million more persons were living on farms in the United States on January 1, 1935 than on April 1, 1930. The 1935 census was the largest ever recorded. Gains during the last five-year period in the number of persons living on farms occurred around industrial centers, mining sections and in areas designated as "subsistence farming" areas. During these five years, thousands formerly employed in factories, mines and other industries moved to unoccupied farms.

The following table shows the farm population of the United States on January 1 of the indicated years:

1910	32,076,960
1920	31,614,269
1921	31,703,000
1922	31,768,000
1923	31,290,000
1924	31,056,000
1925	31,064,000
1926	30,784,000
1927	30,281,000
1928	30,275,000
1929	30,257,000
1930	30,169,000
1931	30,585,000
1932	31,241,000
1933	32,242,000
1934	32,509,000
1935	31,800,907

POPULATIONS—Cities over 33,000

(Last Census—1930)

CITIES OVER 33,000	1910	1920	1930
Akron, Ohio	69,067	208,435	255,040
Alameda, Calif.	23,383	28,806	35,033
Albany, N.Y.	100,253	113,344	127,412
Allentown, Pa.	51,913	73,502	92,563
Altoona, Pa	52,127	60,331	82,054
Amarillo, Tex.	9,957	15,494	43,132
Amsterdam, N.Y.	31,267	33,524	34,817
Anderson, Ind.	22,476	29,767	39,084
Asheville, N.C.	18,762	28,504	50,193
Atlanta, Ga.	154,839	200,616	270,366
Atlantic City, N.J	46,150	50,707	66,198
Auburn, N.Y.	34,668	36,192	36,652
Augusta, Ga.	41,040	52,548	60,342
Aurora, Ill.	29,807	36,397	46,589
Austin, Texas	29,860	34,876	53,120
Baltimore, Md.	558,485	733,826	804,874
Battle Creek, M.	25,267	36,164	43,573
Bay City, Mich.	45,166	47,554	47,355
Bayonne, N.J.	55,545	76,754	88,979
Beaumont, Tex.	20,640	40,422	57,732
Berkeley, Calif.	40,434	56,036	82,109
Berwyn, Ill.	5,841	14,150	47,027
Bethlehem, Pa.	12,837	50,358	57,892
Binghamton, NY	48,443	66,800	76,662
Birmingham, Ala.	132,685	178,806	259,678
Bloomfield, N.J.	15,070	22,019	38,077
Boston, Mass.	670,585	748,060	781,188
Bridgep't, Conn.	102,054	143,555	146,716
Brockton, Mass.	56,878	66,254	63,797
Buffalo, N.Y.	423,715	506,775	573,076
Butte, Mont.	39,165	41,611	39,532
Cambridge, Mass.	104,839	109,694	113,643
Camden, N.J.	94,538	116,309	118,700
Canton, Ohio	50,217	87,091	104,906
Cedar Rapids, Ia.	32,811	45,566	56,097
Charleston, S.C.	58,833	67,957	62,265
Charleston, W.Va.	22,996	39,608	60,408
Charlotte, N.C.	34,014	46,338	82,675
Chattanooga, T.	44,604	57,895	119,798
Chelsea, Mass.	32,452	43,184	45,816
Chester, Pa.	38,537	58,030	59,164
Chicago, Ill.	2,185,283	2,701,705	3,376,438
Chicopee, Mass.	25,401	36,214	43,930
Cicero, Ill	14,557	44,995	66,602
Cincinnati, O.	363,591	401,247	451,160
Cleveland, O.	560,663	796,841	900,429
Cleveland Hts.,O	2,955	15,236	50,945
Clifton, N.J.		26,470	46,875
Colorado Sp. Colo	29,078	30,105	33,237
Columbia, S.C.	26,319	37,524	51,581
Columbus, Ga.	20,554	31,125	43,131
Columbus, O.	181,511	237,031	290,564
Council Bluff, Ia.	29,292	36,162	42,048
Covington, Ky.	53,270	57,121	65,252
Cranston, R.I.	21,107	29,407	42,911
Cumberland,Md.	21,839	29,837	37,747
Dallas, Texas	92,104	158,976	260,475
Danville, Ill.	27,872	33,776	36,765
Davenport, Ia.	43,028	56,727	60,751
Dayton, O.	116,577	152,559	200,982
Dearborn, Mich.	911	2,470	50,358
Decatur, Ill.	31,140	43,818	57,510
Denver, Colo.	213,381	256,491	287,861
Des Moines, Ia.	86,368	126,468	142,559
Detroit, Mich.	465,766	993,678	1,568,662
Dubuque, Iowa	38,494	39,141	41,679
Duluth, Minn.	78,466	98,917	101,463
Durham, N.C.	18,241	21,719	52,037
E. Chicago, Ind.	19,098	35,967	54,784
E. Cleveland, O.	9,179	27,292	39,667
Easton, Pa.	28,523	33,813	34,468

CITIES OVER 33,000	1910	1920	1930
E Orange, N J.	34,371	50,710	68,020
E St. Louis, Ill.	58,547	66,767	74,347
Elgin. Ill.	25 976	27,454	35,929
Elizabeth, N J.	73,409	95,783	114,589
Elmira, N Y.	37,176	45,393	47,397
El Paso, Texas	39,279	77,560	102,421
Erie, Pa.	66,525	93,372	115,967
Evanston, Ill.	24,978	37,234	63,338
Evansville, Ind.	69,647	85,264	102,249
Everett, Mass.	33,484	40,120	48,424
Fall River, Mass.	119,295	120,485	115,274
Fitchburg, Mass.	37,826	41,029	40,692
Flint, Mich.	38,550	91,599	156,492
Ft. Wayne, Ind.	63,933	86,549	114,946
Ft. Worth, Tex.	73,312	106,482	163,447
Fresno, Calif.	24,892	45,086	52,513
Galveston, Tex.	36,981	44,255	52,938
Gary, Ind.	11,802	55,378	100,426
Glendale, Calif.	2,746	13,536	62,736
Grand Rapids, M.	112,571	137,634	168,592
Green Bay, Wis.	25,236	31,017	37,415
Greensboro, N.C.	15,895	19,861	53,569
Hamilton, O.	35,279	39,675	52,176
Hammond, Ind.	20,925	36,004	64,560
Hamtramck, M.	3,559	48,615	56,268
Harrisburg, Pa.	64,186	75,917	80,339
Hartford, Conn.	98,915	138,036	164,072
Haverhill, Mass.	44,115	53,884	48,710
Hazleton, Pa.	25,452	32,377	36,765
Highland Pk., M.	4,120	46,499	52,959
High Point, N.C.	9,525	14,302	36,745
Hoboken, N.J.	70,324	68,166	59,261
Holyoke, Mass.	57,730	60,203	56,537
Houston, Texas	78,800	138,276	292,352
Huntington,W.Va	31,161	50,177	75,572
Indianapo's, Ind.	233,650	314,194	364,161
Irvington, N.J.	11,877	25,480	56,733
Jackson, Mich.	31,433	48,374	55,187
Jackson, Miss.	21,262	22,817	48,282
Jacksonville,Fla.	57,699	91,558	129,549
Jamestown,N.Y.	31,297	38,917	45,155
Jersey Ciy, N.J.	267,779	298,103	316,715
Johnstown, Pa.	55,482	67,327	66,993
Joliet, Ill.	34,670	38,442	42,993
Joplin, Mo.	32,073	29,902	33,454
Kalamazoo, M.	39,437	48,487	54,786
Kansas City, Kan.	82,331	101,177	121,857
Kansas City, Mo.	248,381	324,410	399,746
Kearny, N.J.	18,659	26,724	40,716
Kenosha, Wis.	21,371	40,472	50,262
Knoxville, Tenn.	36,346	77,818	105,802
La Crosse, Wis.	30,417	30,421	39,614
Lakewood, O.	15,181	41,732	70,509
Lancaster, Pa.	47,227	53,150	59,949
Lansing, Mich.	31,229	57,327	78,399
Lawrence, Mass.	85,892	94,270	85,068
Lewiston, Me.	26,247	31,791	34,948
Lexington, Ky.	35,099	41,534	45,736
Lima, Ohio	30,508	41,326	42,287
Lincoln, Neb.	43,973	54,948	75,933
Little Rock, Ark.	45,941	65,142	81,679
Long Beach, Calif.	17,809	55,593	142,032
Lorain, Ohio	28,883	37,295	44,512
Los Angeles, Calif.	319,198	576,673	1,238,048
Louisville, Ky.	223,928	234,891	307,745
Lowell, Mass.	106,294	112,759	100,234
Lynchburg, Va.	29,494	30,070	40,661
Lynn, Mass.	89,336	99,148	102,320
Macon, Ga.	40,665	52,995	53,829
Madison, Wis.	25,531	38,378	57,899
Malden, Mass.	44,404	49,103	58,036

POPULATIONS—CITIES OVER 33,000

(Last Census—1930)

CITIES OVER 33,000	1910	1920	1930	CITIES OVER 33,000	1910	1920	1930
Manchester,N.H.	70,063	78,384	76,834	Rock Island, Ill.	24,335	35,177	37,953
Mansfield, O.	20,768	27,824	33,525	Sacramento, Cal.	44,696	65,908	93,750
McKeesport, Pa.	42,694	46,781	54,632	Saginaw, Mich.	50,510	61,903	80,715
Medford, Mass.	23,150	39,038	59,714	St. Joseph, Mo.	77,403	77,939	80,935
Memphis, Tenn.	131,105	162,351	253,143	St. Louis, Mo.	687,029	772,897	821,960
Meriden, Conn.	27,265	26,867	38,481	St. Paul, Minn.	214,744	234,698	271,606
Miami, Fla.	5,471	29,571	110,637	St. Peterb'g, Fla.	4,127	14,237	40,425
Milwaukee, Wis.	373,857	457,147	578,249	Salem, Mass.	43,697	42,529	43,353
Minneapolis,Min.	301,408	380,582	464,356	Salt Lake C'y Uta	92,777	118,110	140,672
Mobile, Ala.	51,521	60,777	68,202	San Antonio, Tex.	96,614	161,379	231,542
Montclair, N.J.	21,550	28,810	42,017	San Bernardino	12,779	18,721	37,481
Montgom'y,Ala.	38,136	43,464	66,079	San Diego, Calif.	39,578	74,361	147,995
Mt. Vernon,N.Y.	30,919	42,726	61,499	San Francisco	416,912	506,676	634,394
Muncie, Ind.	24,005	36,524	46,548	San Jose, Calif.	28,946	39,642	57,651
Muskegon, Mich.	24,062	36,570	41,390	Santa Barbara	11,659	19,441	33,613
Nashville, Tenn.	110,364	118,342	153,866	Santa Monica	7,847	15,252	37,146
Newark, N.J.	347,469	414,524	442,337	Savannah, Ga.	65,064	83,252	85,024
N.Bedford, Mass.	96,652	121,217	112,597	Schenectady,N.Y.	72,826	88,723	95,692
N.Britain, Conn.	43,916	59,316	68,128	Scranton, Pa.	129,867	137,783	143,433
N.Brunswick,N.J.	23,388	32,779	34,555	Seattle, Wash.	237,194	315,312	365,583
N.Castle, Pa.	36,280	44,938	48,674	Sheboygan, Wis.	26,398	30,955	39,251
N.Haven, Conn.	133,605	162,537	162,655	Shreveport, La.	28,015	43,874	76,655
N.Orleans, La.	339,075	387,219	458,762	Sioux City, Iowa	47,828	71,227	79,183
Newport News,V.	20,205	35,596	34,417	Sioux Falls, S.D.	14,094	25,202	33,362
N.Rochelle, N.Y.	28,867	36,213	54,000	Somerville, Mass.	77,236	93,091	103,908
Newton, Mass.	39,806	46,054	65,276	South Bend, Ind.	53,684	70,983	104,193
N.Y.C.,N.Y.	4,766,833	5,620,048	6,930,446	Spokane, Wash.	104,402	104,437	115,514
Niagara Falls,NY	30,445	50,760	75,460	Springfield, Ill.	51,678	59,183	71,864
Norfolk, Va.	67,452	115,777	129,710	Springfield, Mass.	88,926	129,614	149,900
Norristown, Pa.	27,875	32,319	35,853	Springfield, Mo.	35,201	39,631	57,727
Norwalk, Conn.	6,954	27,743	36,019	Springfield, O.	46,921	60,840	68,743
Norwood, Ohio	16,185	24,966	33,411	Stamford, Conn.	25,138	35,096	46,346
Oakland, Calif.	150,174	216,261	284,063	Steubenville, O.	22,391	28,508	35,422
Oak Park, Ill.	19,444	39,858	63,982	Stockton, Calif.	23,253	40,296	47,963
Ogden, Utah	25,580	32,804	40,272	Superior, Wis.	40,384	39,671	36,113
Oklahoma City	64,205	91,295	185,389	Syracuse, N.Y.	137,249	171,717	209,326
Omaha, Neb.	124,096	191,601	214,006	Tacoma, Wash.	83,743	96,965	106,817
Orange, N.J.	29,630	33,268	35,399	Tampa, Fla.	37,782	51,608	101,161
Oshkosh, Wis.	33,062	33,162	40,108	Taunton, Mass.	34,259	37,137	37,355
Paducah, Ky.	22,760	24,735	33,541	Terre Haute, Ind.	58,157	66,083	62,810
Pasadena, Calif.	30,291	45,354	76,086	Toledo, Ohio	168,497	243,164	290,718
Passaic, N.J.	54,773	63,841	62,959	Topeka, Kansas	43,684	50,022	64,120
Paterson, N.J.	125,600	135,875	138,513	Trenton, N.J.	96,815	119,289	123,356
Pawtucket, R.I.	51,622	64,248	77,149	Troy, N.Y.	76,813	71,996	72,763
Peoria, Ill.	66,950	76,121	104,969	Tulsa, Okla.	18,182	72,075	141,258
Perth Amboy,N.J.	32,121	41,707	43,516	Union City, N.J.	.....	.....	58,679
Philadelphia, Pa.	1,549,008	1,823,779	1,950,961	Utica, N.Y.	74,419	94,156	101,740
Phoenix, Ariz.	11,134	29,053	48,118	Waco, Texas	26,425	38,500	52,848
Pittsfield, Mass.	32,121	41,763	49,677	Waltham, Mass.	27,834	30,915	39,247
Pittsburgh, Pa.	533,905	588,343	669,817	Warren, Ohio	11,081	27,050	41,062
Plainfield, N.J.	20,550	27,700	34,422	Washington,D.C.	331,069	437,571	486,869
Pontiac, Mich.	14,532	34,273	64,928	Waterbury,Conn.	73,141	91,715	99,902
Port Arthur, Tex.	7,663	22,251	50,902	Waterloo, Iowa	26,693	36,230	46,191
Portland, Maine	58,571	69,272	70,810	Waukegan, Ill.	16,069	19,226	33,499
Portland, Ore.	207,214	258,288	310,815	W. Allis, Wis.	6,645	13,745	34,671
Portsmouth, O.	23,481	33,011	42,560	W.NewYork,NJ.	13,560	29,926	37,107
Portsmouth, Va.	33,190	54,387	45,704	Wheeling,W.Va.	41,641	56,208	61,659
Poughk'psie, N.Y.	27,936	35,000	40,288	WhitePlains,N.Y.	15,949	21,031	35,830
Providence, R.I.	224,326	237,595	252,981	Wichita, Kan.	52,450	72,217	111,110
Pueblo, Colo.	41,747	43,050	50,096	Wichita F's, Tex	8,200	40,079	43,690
Quincy, Ill.	36,587	35,978	39,241	Wilkes-Barre,Pa	67,105	73,833	86,626
Quincy, Mass.	32,642	47,876	71,983	Williamsport,Pa.	31,860	36,198	45,729
Racine, Wis.	38,002	58,593	67,542	Wilmington, Del.	87,411	110,168	106,597
Raleigh, N.C.	19,218	24,418	37,379	Winston-Salem	22,700	48,395	75,274
Reading, Pa.	96,071	107,784	111,171	Woonsocket, R.I.	38,125	43,496	49,376
Revere, Mass.	18,219	28,823	35,680	Worcester, Mass.	145,986	179,754	195,311
Richmond, Va.	127,628	171,667	182,929	Yonkers, N.Y.	79,803	100,176	134,646
Roanoke, Va.	34,874	50,842	69,206	York, Pa.	44,750	47,512	55,254
Rochester, N.Y.	218,149	295,750	328,132	Youngstown, O.	79,066	132,358	170,002
Rockford, Ill.	45,401	65,651	85,864	Zanesville, O.	28,026	29,569	36,440

WEIGHTS AND MEASURES

TROY WEIGHT

24 grains = 1 pennyweight
20 pennyweights = 1 ounce
12 ounces = 1 pound

APOTHECARIES' WEIGHT

20 grains = 1 scruple
3 scruples = 1 dram
8 drams = 1 ounce
12 ounces = 1 pound

The ounce and the pound in this system are the same as in troy weight.

SQUARE MEASURE

144 square inches = 1 square foot
9 square feet = 1 square yard
30¼ square yards = 1 square rod
40 square rods = 1 rood
4 roods = 1 acre
640 acres = 1 square mile

DRY MEASURE

2 pints = 1 quart
8 quarts = 1 peck
4 pecks = 1 bushel
36 bushels = 1 chaldron

LIQUID MEASURE

4 gills = 1 pint
16 fluid ounces = 1 pint
2 pints = 1 quart
4 quarts = 1 gallon
31½ gallons = 1 barrel
2 barrels = 1 hogshead

CLOTH MEASURE

2½ inches = 1 nail
4 nails = 1 quarter
4 quarters = 1 yard

LONG MEASURE

12 inches = 1 foot
3 feet = 1 yard
5½ yards = 1 rod
40 rods = 1 furlong
8 furlongs = 1 standard mile
3 miles = 1 league

TIME MEASURE

60 seconds = 1 minute
60 minutes = 1 hour
24 hours = 1 day
7 days = 1 week
28, 29, 30 or 31 days = 1 calendar month
365 days = 1 year
366 days = 1 leap year

AVOIRDUPOIS WEIGHT

27 11/32 grains = 1 dram
16 drams = 1 ounce
16 ounces = 1 pound
25 pounds = 1 quarter
4 quarters = 1 hundredweight
2,000 pounds = 1 short ton
2,240 pounds = 1 long ton

SURVEYORS' MEASURE

7.92 inches = 1 link
25 links = 1 rod
4 rods = 1 chain
10 square chains or 160 square rods = 1 acre
640 acres = 1 square mile
36 sq. miles (6 miles sq.) = 1 township

CUBIC MEASURE

1,728 cubic inches = 1 cubic foot
27 cubic feet = 1 cubic yard
2,150.42 cubic inches = 1 standard bushel
231 cubic inches = 1 standard gallon (liquid)
1 cubic foot = 4/5 of a bushel
128 cubic feet = 1 cord (wood)
40 cubic feet = 1 ton (shipping)

KITCHEN WEIGHTS AND MEASURES

Each of the following quantities weighs one pound:

2 cups lard
2 cups butter
4 cups pastry or bread flour
3⅞ cups entire wheat flour
4 cups graham flour
3 cups corn-meal
4¾ cups rolled oats
4¼ cups coffee
2 cups granulated sugar
2½ cups powdered sugar
3½ cups confectioner's sugar
2½ cups brown sugar
2 cups chopped meat
1⅞ cups rice
2 cups raisins (packed)
2¼ cups currants
9 large eggs

A salt spoon equals one-fourth teaspoon.

A tablespoonful (liquid) equals four teaspoons.

A tablespoonful (dry) equals three teaspoons.

A wine glass is about one-fourth of a tumbler.

THE METRIC SYSTEM

LINEAR MEASURE

10 millimeters (mm.)	= 1 centimeter (cm.)
10 centimeters	= 1 decimeter (dm.)
10 decimeters	= 1 meter (m.)
10 meters	= 1 decameter (Dm.)
10 decameters	= 1 hectometer (Hm.)
10 hectometers	= 1 kilometer (Km.)
10 kilometers	= 1 myriameter (Mm.)

SQUARE MEASURE

100 square millimeters (sq. mm.)	= 1 square centimeter (sq. cm.)
100 square centimeters	= 1 square decimeter (sq. dm.)
100 square decimeters	= 1 square meter (sq. m.)
100 square meters	= 1 square decameter (sq. Dm.)
100 square decameters	= 1 square hectometer (sq. Hm.)
100 square hectometers	= 1 square kilometer (sq. Km.)

LAND MEASURE

100 centares (ca.)	= 1 are (a)	= 100 sq. m.
100 ares	= 1 hectare (Ha.)	= 10,000 sq. m.

CUBIC MEASURE

1,000 cubic millimeters (cu. mm.)	= 1 cubic centimeter (cu. cm.)
1,000 cubic centimeters	= 1 cubic decimeter (cu. cm.)
1,000 cubic decimeters	= 1 cubic meter (cu. m.)

WOOD MEASURE

10 decisteres (ds.)	= 1 stere (s.)	= 1 cu. m.
10 steres	= 1 decastere (Ds.)	= 10 cu. m.

MEASURE OF CAPACITY

10 milliliters (ml.)	= 1 centiliter (cl.)
10 centiliters	= 1 deciliter (dl.)
10 deciliters	= 1 liter (l.)
10 liters	= 1 decaliter (Dl.)
10 decaliters	= 1 hectoliter (Hl.)
10 hectoliters	= 1 kiloliter (Kl.)

MEASURE OF WEIGHT

10 milligrams (mg.)	= 1 centigram (cg.)
10 centigrams	= 1 decigram (dg.)
10 decigrams	= 1 gram (g.)
10 grams	= 1 decagram (Dg.)
10 decagrams	= 1 hectogram (Hg.)
10 hectograms	= 1 kilogram (Kg.)
10 kilograms	= 1 myriagram (Mg.)
10 myriagrams	= 1 quintal (Q.)
10 quintals	= 1 tonneau (T.)

The gram is the unit of weight. It is the weight of 1 cu. cm. of distilled water in a vacuum at its greatest density (39.2°F.). It is equivalent to 15.4324 grain.

WEDDING ANNIVERSARIES

1st	Cotton
2nd	Paper
3rd	Leather
5th	Wooden
7th	Woolen
10th	Tin
12th	Silk and Linen
15th	Crystal
20th	China
25th	Silver
30th	Pearl
40th	Ruby
50th	Golden
75th	Diamond

POSTAL INFORMATION

POSTAL RATES—DOMESTIC

First Class Matter may be forwarded from one Post Office to another without additional postage but other matter must have new postage.

LETTERS AND POSTAL CARDS—FIRST CLASS

Written and Typewritten Matter, each ounce and fraction..... .03
(Except when mailed for local delivery, when the rate is 2c for each ounce or fraction)

Post Cards and Private Mailing Cards which comply with Departmental requirements..... .01

Business Reply Cards or Letters: Consult Post Office.

NEWSPAPERS AND PERIODICALS—SECOND CLASS

Entire Newspapers or Magazines when mailed by the public, for each two ounces or fraction regardless of distance or weight..... .01

Fourth class rate applies when it is lower than second class.

MERCHANDISE AND MISCELLANEOUS—THIRD CLASS

(Limit of weight, 8 ounces)

Merchandise, incomplete copies of newspapers, printed and other mailable matter, each 2 ounces or fraction..... .015

Books, catalogues (must be of 24 or more pages and substantially bound, with at least 22 pages printed), seeds, cuttings, bulbs, roots, scions and plants, 2 ounces or fraction..... .01

Plain Printed Cards containing no writing other than the address, and not conforming with regulation size of Post Card, shall be considered Third Class and mailed for..... .015

Permit Mail: Envelopes, folders, etc., which are to be mailed under Third Class permit privileges should indicate the amount of postage paid.

Bulk Mailings: Applications for bulk mailing privilege should be submitted to the Post Office.

PARCEL POST—FOURTH CLASS

(For Zone consult Post Office)

Everything over 8 ounces, including books and printed matter, except First Class and newspapers and other periodicals entered as Second Class matter mailed by the publishers or the public:

TABLE OF FOURTH-CLASS OR PARCEL-POST RATES EFFECTIVE OCTOBER 1, 1932

		ZONES							
Weight in Pounds	Local	1st Up to 50 Miles	2nd 50 to 150 Miles	3rd 150 to 300 Miles	4th 300 to 600 Miles	5th 600 to 1,000 Miles	6th 1,000 to 1,400 Miles	7th 1,400 to 1,800 Miles	8th Over 1,800 Miles
1	$0.07	$0.08	$0.08	$0.09	$0.10	$0.11	$0.12	$0.14	$0.15
2	.08	.10	.10	.11	.14	.17	.19	.23	.26
3	.08	.11	.11	.13	.17	.22	.26	.32	.37
4	.09	.12	.12	.15	.21	.27	.33	.41	.48
5	.09	.13	.13	.17	.24	.33	.40	.50	.59
6	.10	.14	.14	.19	.28	.38	.47	.59	.70
7	.10	.15	.15	.21	.31	.43	.54	.68	.81
8	.11	.16	.16	.23	.35	.49	.61	.77	.92
9	.11	.17	.17	.25	.38	.54	.68	.86	1.03
10	.12	.18	.18	.27	.42	.59	.75	.95	1.14
11	.12	.19	.19	.29	.45	.64	.82	1.04	1.25
12	.13	.21	.21	.31	.49	.70	.89	1.13	1.36
13	.13	.22	.22	.33	.52	.75	.96	1.22	1.47
14	.14	.23	.23	.35	.56	.80	1.03	1.31	1.58
15	.14	.24	.24	.37	.59	.86	1.10	1.40	1.69
16	.15	.25	.25	.39	.63	.91	1.17	1.49	1.80
17	.15	.26	.26	.41	.66	.96	1.24	1.58	1.91
18	.16	.27	.27	.43	.70	1.02	1.31	1.67	2.02
19	.16	.28	.28	.45	.73	1.07	1.38	1.76	2.13
20	.17	.29	.29	.47	.77	1.12	1.45	1.85	2.24
21	.17	.30	.30	.49	.80	1.17	1.52	1.94	2.35
22	.18	.32	.32	.51	.84	1.23	1.59	2.03	2.46
23	.18	.33	.33	.53	.87	1.28	1.66	2.12	2.57
24	.19	.34	.34	.55	.91	1.33	1.73	2.21	2.68
25	.19	.35	.35	.57	.94	1.39	1.80	2.30	2.79
26	.20	.36	.36	.59	.98	1.44	1.87	2.39	2.90
27	.20	.37	.37	.61	1.01	1.49	1.94	2.48	3.01
28	.21	.38	.38	.63	1.05	1.55	2.01	2.57	3.12
29	.21	.39	.39	.65	1.08	1.60	2.08	2.66	3.23
30	.22	.40	.40	.67	1.12	1.65	2.15	2.75	3.34
31	.22	.41	.41	.69	1.15	1.70	2.22	2.84	3.45
32	.23	.43	.43	.71	1.19	1.76	2.29	2.93	3.56
33	.23	.44	.44	.73	1.22	1.81	2.36	3.02	3.67
34	.24	.45	.45	.75	1.26	1.86	2.43	3.11	3.78
35	.24	.46	.46	.77	1.29	1.92	2.50	3.20	3.89
36	.25	.47	.47	.79	1.33	1.97	2.57	3.29	4.00
37	.25	.48	.48	.81	1.36	2.02	2.64	3.38	4.11
38	.26	.49	.49	.83	1.40	2.08	2.71	3.47	4.22
39	.26	.50	.50	.85	1.43	2.13	2.78	3.56	4.33
40	.27	.51	.51	.87	1.47	2.18	2.85	3.65	4.44
41	.27	.52	.52	.89	1.50	2.23	2.92	3.74	4.55
42	.28	.54	.54	.91	1.54	2.29	2.99	3.83	4.66
43	.28	.55	.55	.93	1.57	2.34	3.06	3.92	4.77
44	.29	.56	.56	.95	1.61	2.39	3.13	4.01	4.88

ZONES

Weight in Pounds	Local	1st Up to 50 Miles	2nd 50 to 150 Miles	3rd 150 to 300 Miles	4th 300 to 600 Miles	5th 600 to 1,000 Miles	6th 1,000 to 1,400 Miles	7th 1,400 to 1,800 Miles	8th Over 1,800 Miles
45	$0.29	$0.57	$0.57	$0.97	$1.64	$2.45	$3.20	$4.10	$4.99
46	.30	.58	.58	.99	1.68	2.50	3.27	4.19	5.10
47	.30	.59	.59	1.01	1.71	2.55	3.34	4.28	5.21
48	.31	.60	.60	1.03	1.75	2.61	3.41	4.37	5.32
49	.31	.61	.61	1.05	1.78	2.66	3.48	4.46	5.43
50	.32	.62	.62	1.07	1.82	2.71	3.55	4.55	5.54
51	.32	.63	.63	1.09	1.85	2.76	3.62	4.64	5.65
52	.33	.65	.65	1.11	1.89	2.82	3.69	4.73	5.76
53	.33	.66	.66	1.13	1.92	2.87	3.76	4.82	5.87
54	.34	.67	.67	1.15	1.96	2.92	3.83	4.91	5.98
55	.34	.68	.68	1.17	1.99	2.98	3.90	5.00	6.09
56	.35	.69	.69	1.19	2.03	3.03	3.97	5.09	6.20
57	.35	.70	.70	1.21	2.06	3.08	4.04	5.18	6.31
58	.36	.71	.71	1.23	2.10	3.14	4.11	5.27	6.42
59	.36	.72	.72	1.25	2.13	3.19	4.18	5.36	6.53
60	.37	.73	.73	1.27	2.17	3.24	4.25	5.45	6.64
61	.37	.74	.74	1.29	2.20	3.29	4.32	5.54	6.75
62	.38	.76	.76	1.31	2.24	3.35	4.39	5.63	6.86
63	.38	.77	.77	1.33	2.27	3.40	4.46	5.72	6.97
64	.39	.78	.78	1.35	2.31	3.45	4.53	5.81	7.08
65	.39	.79	.79	1.37	2.34	3.51	4.60	5.90	7.19
66	.40	.80	.80	1.39	2.38	3.56	4.67	5.99	7.30
67	.40	.81	.81	1.41	2.41	3.61	4.74	6.08	7.41
68	.41	.82	.82	1.43	2.45	3.67	4.81	6.17	7.52
69	.41	.83	.83	1.45	2.48	3.72	4.88	6.26	7.63
70	.42	.84	.84	1.47	2.52	3.77	4.95	6.35	7.74

(a) In the first or second zone, where the distance by the shortest regular practicable mail route is 300 miles or more, the rate is 9 cents for the first pound and 2 cents for each additional pound.

(b) On parcels collected on rural routes the postage is 2 cents less per parcel than shown in the foregoing table when for local delivery and 3 cents less per parcel when for other than local delivery.

(c) Parcels weighing less than 10 pounds and measuring over 84 inches, but not more than 100 inches in length and girth combined, are subject to a minimum charge equal to that for a 10-pound parcel for the zone to which addressed.

Limit of size for parcels is 100 inches in length and girth combined. Limit of weight is 70 pounds in all zones.

Library Books: A special rate is allowed under certain conditions (inquire at Post Office).

SPECIAL HANDLING—(FOURTH CLASS MATTER ONLY)

Parcels will receive first-class handling if, in addition to regular postage, there is added—

For 2 lbs. or less	$0.10
For over 2 lbs. and not more than 10 lbs.	.15
For over 10 lbs.	.20

SPECIAL DELIVERY FEES

	First Class	Second, Third or Fourth Class
Up to 2 pounds	10c	15c
Over 2 pounds up to 10 pounds	20c	25c
Over 10 pounds	25c	35c

The prepayment of the foregoing fee on second, third, or fourth class mail entitles it to the most expeditious handling and transportation practicable, and also entitles it to special delivery at the office of address. For special delivery rates to other countries, consult Post Office.

REGISTERED MAIL

Not to exceed $ 5	$0.15	Not to exceed $400	$0.60
Not to exceed 25	.18	Not to exceed 500	.70
Not to exceed 50	.20	Not to exceed 600	.80
Not to exceed 75	.25	Not to exceed 700	.85
Not to exceed 100	.30	Not to exceed 800	.90
Not to exceed 200	.40	Not to exceed 900	.95
Not to exceed 300	.50	Not to exceed 1000	1.00

POSTAL MONEY ORDERS

For Orders		For Orders	
From $ 0.01 to $ 2.50	6 cents	From $20.01 to $ 40.00	15 cents
From 2.51 to 5.00	8 cents	From 40.01 to 60.00	18 cents
From 5.01 to 10.00	11 cents	From 60.01 to 80.00	20 cents
From 10.01 to 20.00	13 cents	From 80.01 to 100.00	22 cents

PRESIDENTS OF THE UNITED STATES

	Number and Name	Politics	Native State	Born	Inaug.	Age at Inaug.	Date of Death	Age at Death
1	George Washington	Fed.	Va.	1732, Feb. 22	1789	57	1799, Dec. 14	67
2	John Adams	Fed.	Mass.	1735, Oct. 30	1797	61	1826, July 4	90
3	Thomas Jefferson	Rep.	Va.	1743, Apr. 13	1801	57	1826, July 4	83
4	James Madison	Rep.	Va.	1751, Mar. 16	1809	57	1836, June 28	85
5	James Monroe	Rep.	Va.	1758, Apr. 28	1817	58	1831, July 4	73
6	John Quincy Adams	Rep.	Mass.	1767, July 11	1825	57	1848, Feb. 23	80
7	Andrew Jackson	Dem.	N. C.	1767, Mar. 15	1829	61	1845, June 8	78
8	Martin Van Buren	Dem.	N. Y.	1782, Dec. 5	1837	54	1862, July 24	79
9	William Henry Harrison	Whig	Va.	1773, Feb. 9	1841	68	1841, Apr. 4	68
10	John Tyler	Dem.	Va.	1790, Mar. 29	1841	51	1862, Jan. 17	71
11	James Knox Polk	Dem.	N. C.	1795, Nov. 2	1845	49	1849, June 15	53
12	Zachary Taylor	Whig	Va.	1784, Nov. 24	1849	64	1850, July 9	65
13	Millard Filmore	Whig	N. Y.	1800, Jan. 7	1850	50	1874, Mar. 8	74
14	Franklin Pierce	Dem.	N. H.	1804, Nov. 23	1853	48	1869, Oct. 8	64
15	James Buchanan	Dem.	Pa.	1791, Apr. 23	1857	65	1868, June 1	77
16	Abraham Lincoln	Rep.	Ky.	1809, Feb. 12	1861	52	1865, Apr. 15	56
17	Andrew Johnson	Rep.	N. C.	1808, Dec. 29	1865	56	1875, July 31	66
18	Ulysses Simpson Grant	Rep.	Ohio	1822, Apr. 27	1869	46	1885, July 23	63
19	Rutherford B. Hayes	Rep.	Ohio	1822, Oct. 4	1877	54	1893, Jan. 17	70
20	James Abram Garfield	Rep.	Ohio	1831, Nov. 19	1881	49	1881, Sept. 19	49
21	Chester Alan Arthur	Rep.	Vt.	1830, Oct. 5	1881	50	1886, Nov. 18	56
22	Grover Cleveland	Dem.	N. J.	1837, Mar. 18	1885	47	1908, June 24	71
23	Benjamin Harrison	Rep.	Ohio	1833, Aug. 20	1889	55	1901, Mar. 13	67
24	Grover Cleveland	Dem.	N. J.	1837, Mar. 18	1893	55	1908, June 24	71
25	William McKinley	Rep.	Ohio	1843, Jan. 29	1897	54	1901, Sept. 14	58
26	Theodore Roosevelt	Rep.	N. Y.	1858, Oct. 27	1901	42	1919, Jan. 6	61
27	William Howard Taft	Rep.	Ohio	1857, Sept. 8	1909	51	1930, Mar. 8	72
28	Woodrow Wilson	Dem.	Va.	1856, Dec. 28	1913	56	1924, Feb. 3	67
29	Warren G. Harding	Rep.	Ohio	1865, Nov. 2	1921	55	1923, Aug. 2	58
30	Calvin Coolidge	Rep.	Vt.	1872, July 4	1923	51	1933, Jan. 5	60
31	Herbert Clark Hoover	Rep.	Iowa	1874, Aug. 10	1929	54	.....	..
32	Franklin D. Roosevelt	Dem.	N. Y.	1882, Jan. 30	1933	51	.....	..

TIME COMPARISONS

NEW YORK AND FOREIGN CITIES

At 12 o'clock noon U. S. Eastern Standard Time, clock-times in foreign cities, together with the actual longitude differences in hours and minutes, are:

		H. M.			H. M.
Alexandria	7:00 P.M.	6 55 E.	Lima	12:00 Noon	13 W.
Amsterdam	5:20 P.M.	5 16 E.	Lisbon	5:00 P.M.	4 19 E.
Athens	7:00 P.M.	6 31 E.	Liverpool	5:00 P.M.	4 44 E.
Auckland	4:30 A.M.*	16 40 E.	London	5:00 P.M.	4 56 E.
Bangkok	12:00 Mid.	11 36 E.	Madrid	5:00 P.M.	4 41 E.
Belfast	5:00 P.M.	4 32 E.	Manila	1:00 A.M.*	13 0 E.
Berlin	6:00 P.M.	5 49 E.	Mexico City	11:00 A.M.	1 40 W.
Bogota	12:03 P.M.	1 W.	Montevideo	1:30 P.M.	1 11 E.
Bombay	10:30 P.M.	9 47 E.	Montreal	12:00 Noon	2 E.
Bremen	6:00 P.M.	5 31 E.	Moscow	7:00 P.M.	7 26 E.
Brussels	5:00 P.M.	5 13 E.	Oslo	6:00 P.M.	5 39 E.
Budapest	6:00 P.M.	6 12 E.	Paris	5:00 P.M.	5 5 E.
Buenos Aires	1:00 P.M.	1 2 E.	Rio de Janeiro	2:00 P.M.	2 3 E.
Calcutta	10:53 P.M.	10 45 E.	Rome	6:00 P.M.	5 46 E.
Cape Town	7:00 P.M.	6 10 E.	Santiago (Chile)	12:00 Noon	0 13 E.
Copenhagen	6:00 P.M.	5 46 E.	Shanghai	1:00 A.M.*	13 4 E.
Danzig	6:00 P.M.	6 11 E.	Singapore	12:00 Mid.	11 52 E.
Delhi	10:30 P.M.	10 03 E.	Stockholm	6:00 P.M.	6 8 E.
Dublin	5:00 P.M.	4 31 E.	Sydney (N.S.W.)	3:00 A.M.*	15 1 E.
Geneva	6:00 P.M.	5 21 E.	Teheran	8:00 P.M.	8 24 E.
Havana	12:00 Noon	33 W.	Vancouver	9:00 A.M.	3 17 W.
Havre	5:00 P.M.	4 56 E.	Vienna	6:00 P.M.	6 1 E.
Honolulu	6:30 A.M.	5 36 W.	Warsaw	6:00 P.M.	6 20 E.
Hong Kong	1:00 A.M.*	12 33 E.	Winnipeg	11:00 A.M.	1 32 W.
Istanbul	7:00 P.M.	6 52 E.	Yokohama	2:00 A.M.*	14 14 E.
Leningrad	7:01 P.M.	6 57 E.	Zurich	6:00 P.M.	5 30 E.

At places marked * the time noted is in the morning of the following day.

TIME DIFFERENCES—UNITED STATES CITIES

At 12 o'clock noon, U. S. Eastern Standard Time, it is in:

Atlanta, Ga.	11:00 A.M.	Detroit, Mich.	12:00 Noon	Norfolk, Va.	12:00 Noon
Baltimore, Md.	12:00 Noon	El Paso, Tex.	10:00 A.M.	Omaha, Neb.	11:00 A.M.
Birmingham, Ala.	11:00 A.M.	Galveston, Tex.	11:00 A.M.	Philadelphia, Pa.	12:00 Noon
Boston, Mass.	12:00 Noon	Indianapolis, Ind.	11:00 A.M.	Pittsburgh, Pa.	12:00 Noon
Buffalo, N.Y.	12:00 Noon	Kansas City, Mo.	11:00 A.M.	Richmond, Va.	12:00 Noon
Charleston, S.C.	12:00 Noon	Los Angeles, Cal.	9:00 A.M.	Salt Lake City	10:00 A.M.
Chicago, Ill.	11:00 A.M.	Louisville, Ky.	11:00 A.M.	San Francisco	9:00 A.M.
Cincinnati, Ohio	12:00 Noon	Memphis, Tenn.	11:00 A.M.	Savannah, Ga.	12:00 Noon
Cleveland, Ohio	12:00 Noon	Milwaukee, Wis.	11:00 A.M.	Seattle, Wash.	9:00 A.M.
Dallas, Texas	11:00 A.M.	Minneapolis, Minn.	11:00 A.M.	St. Louis, Mo.	11:00 A.M.
Denver, Col.	10:00 A.M.	New Orleans, La.	11:00 A.M.	Washington, D.C.	12:00 Noon

WHEAT HARVEST TIMES OF THE WORLD

January—Australia, New Zealand, Chile and Argentine Republic.

February and March—East India and Upper Egypt.

April—Lower Egypt, Syria, Cyprus, Persia, Asia Minor, India, Mexico and Cuba.

May—Algeria, Central Asia, China, Japan, Morocco, Texas and Florida.

June—Turkey, Greece, Italy, Spain, Portugal, South of France, California, Oregon, Louisiana, Mississippi, Alabama, Georgia, Carolina, Tennessee, Virginia, Kentucky, Kansas, Arkansas, Utah, Colorado and Missouri.

July—Roumania, Bulgaria, Austria, Hungary, South of Russia, Germany, Switzerland, France, South of England, Nebraska, Minnesota, Wisconsin, Iowa, Illinois, Indiana, Michigan, Pennsylvania, Ohio, New York, New England and Upper Canada.

August—Belgium, Holland, Great Britain, Denmark, Poland, Lower Canada, Columbia, Manitoba and Dakota.

September and October—Scotland, Sweden, Norway and North of Russia.

November—Peru and South Africa.

December—Burma.

WEATHER SIGNS AND INFORMATION

U. S. Department of Agriculture

Weather Bureau

Explanation of Flag Signals

No. 1 WHITE FLAG.

CLEAR OR FAIR

No. 1, alone, indicates fair weather, stationary temperature.

No. 2, alone, indicates rain or snow, stationary temperature.

No. 2 BLUE FLAG.

RAIN OR SNOW.

No. 3, alone, indicates local rain, stationary temperature.

No. 1, with No. 4 above it, indicates fair weather, warmer.

No. 1, with No. 4 below it, indicates fair weather, colder.

No. 3 WHITE AND BLUE FLAG.

LOCAL RAINS.

No. 2, with No. 4 above it, indicates warmer weather, rain or snow.

No. 2, with No. 4 below it, indicates colder weather, rain or snow.

No. 4 BLACK TRIANGULAR FLAG.

TEMPERATURE

No. 3, with No. 4 above it, indicates warmer weather with local rains.

No. 3, with No. 4 below it, indicates colder weather with local rains.

No. 1, with No. 5 above it, indicates fair weather, cold wave.

No. 5 WHITE FLAG, BLACK CENTER.

COLD WAVE.

No. 2, with No. 5 above it, indicates wet weather, cold wave.

Forecasts made at 10 A.M. and displayed between 12 and 1 P. M. forecast the weather for the following day until 8 P. M.

You can foretell the weather for many hours ahead almost as accurately as any weather man. You can read it from the clouds and the color of the sky, the sun and the moon.

Soft looking, delicate clouds and a bright blue sky indicate fair weather.

High clouds which disappear indicate fine weather, but if they come lower and become larger, changeable weather is indicated.

Ragged-edged, oily looking clouds and a greenish-yellow sky indicate wind storms.

Light clouds moving across heavy dark clouds indicate wind and rain.

Low, heavy clouds moving in different directions and at different heights indicate heavy rains very soon, and thunderstorms if the weather is hot.

Thin, high clouds, little wind and a light-tinted sky indicate continued fair weather.

When high upper clouds travel in a different direction from the wind felt below, the wind will change.

When the small colored circles (coronas) sometimes seen around the sun or moon grow smaller it will probably rain. If they grow larger fair weather is indicated.

Unusual clearness of the atmosphere during the day or exceptional brightness of the stars at night indicates rain.

Fogs and dews are indications of fair weather. A morning fog usually breaks up before noon.

A rainbow in the morning usually foretells coming showers. A rainbow in the afternoon or evening indicates fair weather.

A grey, lowering sunset or a sunset in a green or yellowish-green sky foretells rains. A red sunrise with heavy, low clouds also foretells rain.

A rosy, calm sunset followed by a grey morning is an excellent indication of fine weather.

When the sun or moon has a large halo in fine weather, rain is indicated.

INTEREST TABLES

YEARS IN WHICH A GIVEN AMOUNT WILL DOUBLE AT INTEREST

Rate	At Simple Interest	At Compound Interest			Rate	At Simple Interest	At Compound Interest		
		Compounded Yearly	Compounded Semi-Annually	Compounded Quarterly			Compounded Yearly	Compounded Semi-Annually	Compounded Quarterly
	Years	*Years*	*Years*	*Years*		*Years*	*Years*	*Years*	*Years*
1	100.0	69.660	69.487	69.237	6	16.67	11.896	11.725	11.639
1½	66.66	46.556	46.382	46.297	6½	15.38	11.007	10.836	10.750
2	50.00	35.003	34.830	34.743	7	14.29	10.245	10.074	9.966
2½	40.00	28.071	27.899	27.748	7½	13.33	9.584	9.414	9.328
3	33.33	23.450	23.278	23.191	8	12.50	9.006	8.837	8.751
3½	28.57	20.149	19.977	19.890	8½	11.76	8.497	8.327	8.241
4	25.00	17.673	17.501	17.415	9	11.11	8.043	7.874	7.788
4½	22.22	15.747	15.576	15.490	9½	10.52	7.638	7.468	7.383
5	20.00	14.207	14.035	13.949	10	10.00	7.273	7.103	7.018
5½	18.18	12.942	12.775	12.689	12	8.34	6.116	5.948	5.862

ORDINARY INTEREST FOR 1 TO 360 DAYS

(The table below gives the interest on $100 at 1 percent)

Days	Int.	Days	Int.	Days	Int.
1	.00277	15	.04166	29	.08056
2	.00555	16	.04444	30	.08333
3	.00833	17	.04722	60	.16667
4	.01111	18	.05000	90	.25000
5	.01389	19	.05278	120	.33333
6	.01667	20	.05556	150	.41667
7	.01944	21	.05833	180	.50000
8	.02222	22	.06111	7 mo.	.58333
9	.02500	23	.06389	8 mo.	.66667
10	.02778	24	.06667	9 mo.	.75000
11	.03056	25	.06944	10 mo.	.83333
12	.03333	26	.07222	11 mo.	.91667
13	.03611	27	.07500	12 mo.	1.00000
14	.03889	28	.07778		

Example: Suppose you borrow $200 for 40 days at 7 percent. The interest for 30 days at 1 percent on $100 is $ .08333. The interest for 10 days at 1 percent on $100 is $ .02778. The sum of these two gives the interest for 40 days, or $ .11111. For $200 the interest for 40 days will be $ .22222. Since this is the rate of 1 percent, multiply by 7 to get the interest at 7 percent. This equals $1.56.

SUGGESTIONS FOR SHIPPING LIVESTOCK

CATTLE

Do not starve cattle the last few days before loading and then give them a heavy feed the last thing. Especially avoid the use of oats and excessive salt just before shipping. The result of this practice is generally that the animal shrinks more during shipment, fills up with water upon arrival and is usually not as saleable as if a regular feed had been supplied. Buyers can easily spot animals which have been treated in this way.

Handle cattle carefully while loading, avoiding bruising. In a standard 36-foot car keep the weight close to the minimum of 22,000 pounds. The car should be well cleaned. In hot weather it is well to put in an inch or two of sand and dampen it before loading. In winter put in good dry straw or other bedding. If bulls are shipped with other cattle they should be well tied. It is better to ship cattle that have been in the same feedlot together than to mix cattle from different feedlots. They will come through in better shape and with less bruises if they know each other.

HOGS

In a standard 36-foot car keep as nearly as possible to the minimum of 17,000 pounds single-deck and 23,000 pounds double-deck. Cars should be well cleaned, and in summer sand should be sprinkled over the floor to a depth of 1 or 2 inches and dampened before loading. Put a small amount of corn in the car. Be very careful in hot weather to avoid overheating. It is better to tease hogs into the car with corn than to drive them around with sticks. Cool by hanging a few chunks of ice in sacks in the top of the car. In the winter time nothing is necessary beyond a good dry car with clean bedding.

SHEEP

The minimum weight for a 36-foot standard car of sheep is 12,000 pounds single-deck and 18,000 pounds double-deck. Sheep should always be loaded in clean, dry cars whether it be winter or summer. The same general rules apply as for cattle.

Shippers generally lose money by either underloading or overloading the minimum weight.

CAPACITIES OF SILOS IN TONS

CAPACITIES OF ROUND SILOS

Inside Height of Silo, Feet	INSIDE DIAMETER OF SILO, FEET							
	8	10	12	14	16	18	20	22
20	17	26	38	51	67	.....	.....	.....
21	18	28	41	55	72	.....	.....	.....
22	19	30	43	59	77	.....	.....	.....
23	20	32	46	63	81	103	.....	.....
24	22	34	49	67	86	110	.....	.....
25	23	36	52	71	91	116	143	.....
26	24	38	55	75	97	123	152	.....
27	25	40	58	79	102	130	160	.....
28	27	42	61	83	109	137	169	205
29	28	44	64	87	114	144	178	216
30	30	47	67	91	119	151	187	226
31	31	49	70	96	125	158	196	237
32	33	51	74	100	131	166	205	248
33	35	53	77	105	137	174	215	260
34	36	56	80	109	143	181	224	271
35	37	58	84	114	149	189	234	282
36	39	61	87	118	155	196	243	293
37	40	63	90	123	161	204	252	305
38	41	66	94	128	167	212	262	316
39	43	68	97	133	173	220	272	328
40	45	70	101	138	180	228	282	340
41	....	72	105	143	187	236	291	352
42	....	74	109	148	193	244	300	363
43	....	....	113	154	201	252	310	375
44	....	....	117	159	207	261	320	387
45	....	....	.....	165	215	269	330	399
46	....	....	.....	170	222	277	340	412
47	....	....	.....	.....	229	285	350	424
48	....	....	.....	.....	236	293	361	436
49	....	....	.....	.....	.....	301	371	449
50	....	....	.....	.....	.....	310	382	462

CAPACITIES OF RECTANGULAR SILOS

Multiply the length by width by height of settled silage. This gives the cubic feet of silage. The table shows the average weight of silage for any given depth. Multiply and get the total pounds of silage. Divide by 2,000 to get the number of tons.

Depth of Silage	Average Wt. In Lbs. Per Cu. Ft.	Depth of Silage	Average Wt. In Lbs. Per Cu. Ft.
11	26.8	23	35.2
12	27.6	24	35.9
13	28.3	25	36.5
14	29.1	26	37.1
15	29.8	27	37.7
16	30.5	28	38.4
17	31.2	29	39.0
18	31.9	30	39.6
19	32.6	31	40.2
20	33.3	32	40.9
21	33.9	33	41.5
22	34.6	34	42.2

CAPACITIES OF CORN CRIBS IN BUSHELS—EAR CORN

HEIGHT 7½ FEET

Length		1	12	14	16	18	20	22	24	28	32	36	40	44	48	60
Width	6	18	216	252	288	324	360	396	432	504	576	648	720	792	864	1080
	6¼	19	225	263	300	338	375	413	450	525	600	675	750	825	900	1125
	6½	20	234	273	312	351	390	429	468	546	624	702	780	858	936	1170
	6¾	20¼	243	284	324	365	405	446	486	567	648	729	810	891	972	1215
	7	21	252	294	336	378	420	462	504	588	672	756	840	924	1008	1260
	7¼	22	261	305	348	392	435	479	522	609	696	783	870	957	1044	1305
	7½	23	269	315	360	405	450	495	540	630	720	810	900	990	1080	1350

For heights other than 7½ ft. multiply the length by the width by the height and either divide by 2.5 or multiply by .4. Grain capacity will be approximately double the above figures.

WATER REQUIREMENTS OF ANIMALS

Horse	7 to 10 gallons daily, average about 8½
Cow	6 to 10 gallons daily, average about 8½
Hog	2 to 3 gallons daily, average about 2½
Sheep	1 to 2 gallons daily, average about 1½
Person	25 to 50 gallons per day, including that used for dishwashing, bathing, etc.

CAPACITIES OF TANKS AND CISTERNS
COMPUTED IN BARRELS OF 31½ GALLONS

Depth	DIAMETER IN FEET															
	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
5	23.3	33.6	45.7	59.7	75.5	93.2	112.8	134.3	157.6	182.8	209.8	238.7	269.5	302.1	336.6	373.0
6	28.0	40.3	54.8	71.7	90.6	111.9	135.4	161.1	189.1	219.3	251.8	286.5	323.4	362.6	400.0	447.6
7	32.7	47.0	64.0	83.6	105.7	130.6	158.0	188.0	220.6	255.9	293.7	334.2	377.3	423.0	471.3	522.2
8	37.3	53.7	73.1	95.5	120.9	149.2	178.0	214.8	252.1	292.4	335.7	382.0	431.2	483.4	538.6	596.8
9	42.0	60.4	82.2	107.4	136.4	167.9	203.1	241.7	283.7	329.0	377.7	429.7	485.1	543.8	605.9	671.4
10	46.7	67.1	91.4	119.4	151.1	186.5	225.7	268.6	315.2	365.5	419.6	477.4	539.0	604.3	673.3	746.0
11	51.3	73.9	100.5	131.3	166.2	205.1	248.2	295.4	346.7	402.1	461.6	525.2	592.9	664.7	740.6	820.6
12	56.0	80.6	109.7	143.2	181.3	223.8	270.8	322.3	378.2	438.6	503.5	572.9	646.8	725.1	807.9	895.2
13	60.7	87.3	118.8	155.2	196.4	242.4	293.4	349.1	409.7	475.2	545.5	620.7	700.7	785.5	875.2	969.8
14	65.3	94.0	127.9	167.1	211.5	261.1	315.9	376.0	441.3	511.8	587.5	668.4	754.6	846.0	942.6	1044.4
15	70.0	100.7	137.1	179.0	226.6	279.8	338.5	402.8	472.8	548.3	629.4	716.2	808.5	906.4	1009.9	1119.0
16	74.7	107.4	146.2	191.0	241.7	298.4	361.1	429.7	504.3	584.9	671.4	763.9	862.4	966.8	1077.2	1193.6
17	79.3	114.1	155.4	202.9	256.8	317.0	383.6	456.6	535.8	621.4	713.4	811.6	916.3	1027.2	1144.6	1268.2
18	84.0	120.9	164.5	214.8	272.0	335.7	406.2	483.4	567.3	658.0	755.3	859.4	970.2	1087.7	1211.9	1342.8
19	88.7	127.6	173.6	226.8	287.0	354.3	428.8	510.3	598.9	694.5	797.3	907.1	1024.1	1148.1	1279.2	1417.4
20	93.3	134.3	182.8	238.7	302.1	373.0	451.3	537.1	630.4	731.1	839.3	954.9	1078.0	1208.5	1346.5	1492.0

GESTATION TABLE

	Average Gestation Period		
	Weeks or	Days	Extremes (Days)
Rabbit	....	30	
Cat	7	50	
Dog	8½	60	
Sow	16	112	109 to 120
Ewe	22	150	146 to 157
Cow	40½	283	240 to 311
Mare	48½	340	307 to 412

Date of Service	Date Animal Due to Give Birth			
	Mare	Cow	Ewe	Sow
Jan. 1	Dec. 6	Oct. 10	May 30	Apr. 22
Jan. 11	Dec. 16	Oct. 20	June 9	May 2
Jan. 21	Dec. 26	Oct. 30	June 19	May 12
Jan. 31	Jan. 5	Nov. 9	June 29	May 22
Feb. 10	Jan. 15	Nov. 19	July 9	June 1
Feb. 20	Jan. 25	Nov. 29	July 19	June 11
Mar. 2	Feb. 4	Dec. 9	July 29	June 21
Mar. 12	Feb. 14	Dec. 19	Aug. 8	July 1
Mar. 22	Feb. 24	Dec. 29	Aug. 18	July 11
Apr. 1	Mar. 6	Jan. 8	Aug. 28	July 21
Apr. 11	Mar. 16	Jan. 18	Sept. 7	July 31
Apr. 21	Mar. 26	Jan. 28	Sept. 17	Aug. 10
May 1	Apr. 5	Feb. 7	Sept. 27	Aug. 20
May 11	Apr. 15	Feb. 17	Oct. 7	Aug. 30
May 21	Apr. 25	Feb. 27	Oct. 17	Sept. 9
May 31	May 5	Mar. 9	Oct. 27	Sept. 19
June 10	May 15	Mar. 19	Nov. 6	Sept. 29
June 20	May 25	Mar. 29	Nov. 16	Oct. 9
June 30	June 4	Apr. 8	Nov. 26	Oct. 19
July 10	June 14	Apr. 18	Dec. 6	Oct. 29
July 20	June 24	Apr. 28	Dec. 16	Nov. 8
July 30	July 4	May 8	Dec. 26	Nov. 18
Aug. 9	July 14	May 18	Jan. 5	Nov. 28
Aug. 19	July 24	May 28	Jan. 15	Dec. 8
Aug. 29	Aug. 3	June 7	Jan. 25	Dec. 18
Sept. 8	Aug. 13	June 17	Feb. 4	Dec. 28
Sept. 18	Aug. 23	June 27	Feb. 14	Jan. 7
Sept. 28	Sept. 2	July 7	Feb. 24	Jan. 17
Oct. 8	Sept. 12	July 17	Mar. 6	Jan. 27
Oct. 18	Sept. 22	July 27	Mar. 16	Feb. 6
Oct. 28	Oct. 2	Aug. 6	Mar. 26	Feb. 16
Nov. 7	Oct. 12	Aug. 16	Apr. 5	Feb. 26
Nov. 17	Oct. 22	Aug. 26	Apr. 15	Mar. 8
Nov. 27	Nov. 1	Sept. 5	Apr. 25	Mar. 18
Dec. 7	Nov. 11	Sept. 15	May 5	Mar. 28
Dec. 17	Nov. 21	Sept. 25	May 15	Apr. 7
Dec. 27	Dec. 1	Oct. 5	May 25	Apr. 17

DURATION AND FREQUENCY OF HEAT IN FARM ANIMALS IN REGULAR CONDITION

	In heat for	If not impregnated heat will recur in
Mares	5-7 days*	3 to 6 weeks
Cows	2-3 days*	3 to 4 weeks
Ewes	2-3 days	17 to 28 days
Sows	2-4 days	21 days

*Subject to Variation.

TO FIND QUANTITY OF LUMBER REQUIRED

STUDDING on 16-inch centers. Estimate one to the lineal foot. This allows for doubling at openings and at corners.

JOISTS AND RAFTERS on 16-inch centers. To ¾ of the length of the building, add 1; thus: for a building 16x32, ¾ of 32 = 24, to which add 1, 25 being the number of joists required, or the number of rafters for 1 side. Add 1 or 2 for each bearing partition.

ROOF SHEATHING LAID SOLID. To full area of roof add 10 per-cent for waste. If laid 2 inches apart ¾ of above will be required.

ARTICLE	Count Width	Face Width	Loss in Matching	To area to be covered add
Shiplap	12 in.	11¼	7 %	1-12
Shiplap	10 in.	9¼	8⅓%	1-10
Shiplap	8 in.	7¼	11 %	1-8
Shiplap	6 in.	5¼	12½%	1-5
Flooring	6 in.	5¼	12½%	1-5
Flooring	4¼ in.	3½	18 %	¼
Flooring	4 in.	3¼	19 %	¼
Flooring	3 in.	2¼	25 %	⅓
Flooring	2¾ in.	2	27 %	⅓
Flooring	2½ in.	2	20 %	¼
Flooring	2 in.	1½	33⅓%	½

DROP SIDING, CEILING and PARTITION same as above.

ARTICLE	Size	Exposed	To area to be covered add
Siding beveled	½x4	3¼ in.	¼
Siding beveled	½x4	3 in.	⅓
Siding beveled	½x4	2¾ in.	½
Siding beveled	½x5	4¼ in.	⅕
Siding beveled	½x5	4 in.	¼
Siding beveled	½x5	3¾ in.	⅓
Siding beveled	½x6	5¼ in.	⅕
Siding beveled	½x6	5 in.	9-40
Siding beveled	½x6	4¾ in.	¼

SHINGLES. When exposed to the weather require:

4 inch size, 9 to the square foot
4½ inch size, 8 to the square foot
5 inch size, 7⅕ to the square foot
5½ inch size, 6½ to the square foot
6 inch size, 6 to the square foot
(Add 1-10 for waste)

BRIDGING. Multiply the total lineal feet, measuring each string in a straight line, by the following:

2x6, 2x8, or 2x10 on	16 inch centers by 2
2x12	16 inch centers by 2¼
2x14	16 inch centers by 2½
2x6 and 2x8	12 inch centers by 2
2x10 and 2x12	12 inch centers by 2¼
2x14	12 inch centers by 2⅔

LATTICE.
Width
1⅛, multiply area by 12 for lineal ft. required
1⅜, multiply area by 10 for lineal ft. required
1¾, multiply area by 8 for lineal ft. required

LUMBER RULE

To find the contents of a board, scantling, joist, sill, etc.:

Multiply length (in feet), width and thickness (in inches) together and divide product by 12.

BRICK WORK

Measurements for brick are by cubic foot, counting 22½ bricks per cubic foot in a 12-inch wall, 15 for every superficial foot for a 9-inch wall, 7½ for a 4-inch wall and 30 for a 16-inch wall. No deductions are made for openings less than 70 superficial feet.

HARDWARE

NAILS (wire) to the 1000 ft.	No.	in	1 lb.	L'gth
1000 ft. B. M. framing	10 lb.	20d	35	3⅝ in.
1000 ft. B. M. framing	14 lb.	10d	87	3 in.
1000 ft. B. inch boards	25 lb.	10d	87	3 in.
1000 ft. ½ inch siding	18 lb.	6d	350	2 in.
1000 shingles	3½ lb.	4d	492	1⅜ in.
1000 ft. finishing ⅞	30 lb.	8d	196	2½ in.
1000 ft. finishing 1¼	40 lb.	10d	137	3 in.
1000 ft. fig.	35 lb.	10d	137	3 in.
1000 lath	6½ lb.	3d	720	1¼ in.
1000 ft. sheath, lath	30 lb.	10d	87	3 in.
To case a door	1 lb.	8d	196	2½ in.
To case window	¾ lb.	8d	196	2½ in.

CONCRETE MIXTURES AND MAXIMUM AGGREGATE SIZES

First column refers to cubic feet (one sack) of Portland Cement. Second, cubic feet of sand. Third, cubic feet of pebbles or broken stone (aggregate).

Use	Mixture	Max. size aggregate
One-course walks, barnyard pavements, floors	1:2:3	1½″
Fence Posts	1:2:3	1½″
Watering troughs and tanks	1:2:3	1″
Water Reservoirs, tanks, cisterns, etc.	1:2:3	1″
Steel Reinforced concrete walls, floors, beams, columns	1:2:4	1″
Silo walls, grain and coal bins, building walls, manure pits	1:2½:4	1¾″
Dipping vats, hog wallows	1:2½:4	1″
Backing of concrete block	1:2½:4	¾″
Foundations for small engines, culverts, dams	1:2½:5	2″
Inside finish of water tanks, silos, etc.	1:1½	to pass
Scratch coat to exterior plaster, cement and stucco	1:2½	through
Intermediate and finish stucco coats	1:3	No. 8 screen
Facing concrete blocks, ornamental work	1:2	¼″
Concrete drain tile and pipe where coarse aggregate is not used	1:3	¼″

LENGTH OF TIME FOR TREES TO GROW

Species	Fence Posts	Pulp Fuel	Ties	Poles & Piling	Saw-logs
	Years	Years	Years	Years	Years
Northern:					
Aspen	25–35	30–40	45– 55	60– 70	.....
Beech	65–80	80–95	110–125	145–160	185–200
Birch, paper	30–35	50–55	.....	.....	.....
Birch, yellow	45–55	60–70	75– 85	100–110	130–140
Hemlock	25–40	35–50	50– 65	65– 80	85–100
Maple, sugar	55–70	70–85	90–105	110–125	145–160
Pine, jack	25–35	30–40	50– 60	75– 85	.....
Pine, red	15–25	25–35	30– 40	40– 50	55– 65
Pine, white	25–35	35–45	50– 60	65– 75	90–100
Spruce, red	30–40	45–55	60– 70	.....	.....
Tamarack	50–60	45–55	110–120	160–170	.....
Central Hardwood:					
Chestnut	15–25	25–35	30– 40	45– 55	65– 75
Hickory	40–50	50–60	70– 80	90–100	110–120
Oak, black	25–35	35–45	45– 55	75– 85	125–135
Oak, red	25–35	35–45	45– 55	60– 70	100–110
Oak, white	30–40	40–50	55– 65	90–100	150–160
Poplar, yellow	16–37	22–50	32– 70	45–100	65–135
Catalpa	25–30	.....	.....	.....	.....
Larch, Euro	20–30	25–35	45– 55	.....	.....
Maple, silver	15–25	20–30	25– 35	.....	.....
Walnut, black	15–25	20–30	30–40	.....	.....
Southern:					
Cottonwood	5–15	10–20	15–25	20– 30	25– 35
Ash, white	15–25	20–30	25–35	35– 45	50– 60
Cedar, red	25–35	35–45	50–60	65– 75	.....
Cypress	15–25	20–30	25–35	35– 45	40– 50
Gum, red	10–20	15–25	15–30	20– 30	30– 40
Pine, lobi	15–25	20–30	25–35	35– 45	45– 55
Pine, long	20–30	25–35	45–55	65– 80	90–110
Pine, scrub	15–25	20–30	30–40	40– 50	50– 60
Pine, short	10–20	15–25	20–30	25– 35	55– 65
Pine, slash	15–25	20–30	30–40	60– 70	.....
Rocky Mountain:					
Fir, Douglas	20–30	25–35	30–40	45– 55	60– 70
Pine, lodge	35–45	50–60	75–85	150–160	.....
Pine, yellow	25–40	35–50	45–60	60– 75	80–100
Pacific:					
Fir, white	60–70	70–80	85–95	100–110	120–130
Hemlock	.....	45–55	65–75	90–100	120–130
Pine, sugar	35–45	45–55	60–70	70– 80	100–110
Redwood	15–25	20–30	30–40	45– 55	65– 75

TABLE OF LIVE AND DRESSED WEIGHTS FOR POULTRY, HOGS AND CATTLE

DRESSING PERCENTAGES

CATTLE

	Per-cent
Thin cattle (dairy cows)	40-50
Barely warmed steers	50-55
Good conditioned steers	55-60
Prime-cattle—long fed steers	60-up
Average for cattle	55

HOGS (chilled carcass)

Prime heavy hogs	350-400 lbs.	82-84
Heavy butchers	280-350 lbs.	80-82
Medium butchers	220-280 lbs.	78-80
Light butchers	180-220 lbs.	77-79
Heavy packing	300-500 lbs.	81-83
Medium packing	250-300 lbs.	79-80
Light packing	200-280 lbs.	77-78
Bacon hogs	160-220 lbs.	76-77
Light mixed	150-220 lbs.	75-76
Extra light	125-150 lbs.	74-75
Shipper hogs	100-200 lbs.	72-76

SHEEP

Wide range	40-65
Average lambs	48-52

AVERAGE DRESSING 1200 LB. STEER

		Per-cent
Live weight	1200 lbs.	
Carcass	700 lbs.	58.3
Hide	75	6.2
Head, feet, knees	45	3.7
Oleo fat	80	6.6
Liver	12	1.0
Heart	3	0.25
Lungs	20	1.6
Tongue	5	0.41
Cheek meat	5	0.41
Rough tallow and entrails	84	7.0
Liquid blood	46	3.8
Paunch and contents	106	8.8
Lips and weasand meat	4	0.3
Tail, bung, casings	15	1.2
		99.57

CHICKENS

	Dressing Per-cent	Trussing Per-cent
Cocks	92	76
Cockerels	89	74
Hens	92	76
Pullets	92	74

CUTTING PERCENTAGES

BEEF

	Per-cent of carcass weight
Fore quarters	52
Hind quarters	48
Ribs	9.5
Loin	18
Round	24
Chuck	22
Plate	14.5
Flank and shank	9
Kidney suet	3
	100

HOG

	Per-cent of carcass weight
Loin (chops)	14
Shoulder—butt off	9
Butts	7
Spareribs	2
Ham	21
Bacon	15
Lard	12
Neck, bone, feet, etc.	4
Trimmings	13
Waste	3
	100

SHEEP

Legs	31
Shoulder	16
Loin and short rack	30
Stew—plate, etc	18
Waste	5
	100

VEGETABLE PLANTING TABLE

Crop	Seed per 100 Feet of Row		Planting Distance Between Rows		Depth to Plant in Inches	Distance in Row in Inches	Days Required to Mature from Seed
	Seed	Plants	Horse Cul.	Hand Cul.			
Asparagus roots	.....	66	36–48	36–48	8–10	18–24	3 years
Beans, bush	1 qt.	.....	30–36	18–24	1–1½	2–3	45–65
Beans, bush Lima	1 qt.	.....	30–36	18–30	1–2	4–6	50–70
Beans, pole	¾ pt.	.....	36–38	36	1–2	36–48	45–65
Beans, pole Lima	¾ pt.	.....	36–48	36	1–2	36–48	65–80
Beets	2 oz.	.....	24–36	12–18	1	2–3	60–110
Brussels sprouts	¼ oz.	66	36	20–28	¼–½	18	90–110
Cabbage, early	¼ oz.	66	24–36	20–28	¼–½	18	90–120
Cabbage, late	¼ oz.	50–65	36–42	24–32	½	24–30	100–135
Cabbage, Chinese	⅓ oz.	100	24–28	18–24	½	12–15	80–100
Carrots	½ oz.	.....	24–28	12–18	½	2–3	80–120
Cauliflower	¼ oz.	66	36–42	24–30	½	18	100–120
Celeriac	¼ oz.	200	36	24	⅛	6	125
Celery	¼ oz.	200	26–48	20–24	⅛	4–8	120–150
Chard, Swiss	1 oz.	.....	24–30	15–18	1	6–8	50–120
Corn, sweet	½ pt.	35–65	36–42	30–36	1–2	18–24	75–90
Cucumber	½ oz.	20–25	48–60	48–60	1	48–72	90–130
Eggplant	¼ oz.	50	30–36	24	½	24	150–160
Endive	½ oz.	100	24–28	14–18	½–1	8–12	60–90
Horse-radish roots	.....	70	30–36	24–30	3–4	14–20	120–140
Kale	¼ oz.	100	24–30	15–24	½–1	12–24	90–100
Kohlrabi	¼ oz.	150	24–28	15–24	½	4–8	.....
Leek	½ oz.	.....	24–28	12–18	1	4–6	60–90
Lettuce	½ oz.	200	24–28	12–15	½	4–8	140–180
Muskmelon	½ oz.	20–25	48–60	48–60	1	60–72	90–120
Mustard	¼ oz.	.....	24–28	12–15	¼	2–3	60–90
Okra	1 oz.	50	30–36	30–36	1	24	90–140
Onion seed	1 oz.	.....	24–28	12–15	½–1	2–3	140–160
Onion set	2 qt.	.....	24–28	12–15	1	2–3	45–75
Onion, Bermuda	1 oz.	400	28–36	12–15	1	2–3	130–150
Parsley	¼ oz.	100–200	28–36	12–18	⅛	3–6	90–100
Parsnips	½ oz.	.....	28–36	18–24	½–1	3–5	140–160
Peas	1–2 pt.	.....	30–36	24	1–2	1–2	75–100
Peppers	¼ oz.	66	30–36	24–28	¼	15–20	140–160
Potato, Irish	5–8 lb.	.....	28–36	12–18	3–4	12–18	120–140
Potato, sweet	.....	65–75	36–48	36–48	3–4	14–18	140–150
Pumpkin	½ oz.	10–15	8–12	8–12	1	84–108	90–120
Radish	1 oz.	.....	24–26	12–18	½–1	1½–2	30–65
Rhubarb plants	.....	33	36–60	36–60	2–3	36–60	365
Salsify	1 oz.	.....	30–36	18–24	½–1	2–4	140–160
Spinach	1 oz.	.....	30–36	12–18	1	2–4	60–80
Spinach, N. Zealand	1 oz.	.....	30–36	30–36	1	12–18	60–150
Squash, summer	½ oz.	20–40	36–48	36–38	1	36–38	60–65
Squash, winter	½ oz.	10–25	84–108	84–108	1	84	125–140
Tomatoes	¼ oz.	25–35	36–60	36–48	½	36–48	150–170
Turnips	½ oz.	.....	24–36	18–24	¼–½	.....	60–80
Watermelon	1 oz.	33	96–144	96–144	1	84–108	100–130

FIRST AID TREATMENTS

HELP IN CASE OF DROWNINGS AND OTHER ACCIDENTS

(Revised by Medical Staff, American Red Cross, Washington, D. C.)

DROWNING, ELECTRIC SHOCK, GAS, SMOKE and OTHER SUFFOCATIONS—There are several methods of artificial respiration but the prone pressure method is considered the best:

1. Lay the patient on his belly, one arm extended directly overhead, the other arm bent at elbow and with the face turned outward and resting on hand or forearm, so nose and mouth are free for breathing.

2. Kneel, straddling patient's thighs with your knees placed at such a distance from the hip bones that you can apply pressure direct from shoulder to heels of hands. Place palms of hands on small of back, with fingers resting on ribs, the little finger just touching lowest rib, with thumb and fingers in natural position, and tips of fingers just out of sight.

3. With arms held straight, swing forward slowly, so that the weight of your body is gradually brought to bear upon the patient. The shoulder should be directly over the heel of the hand at the end of the forward swing. Do not bend your elbows. This operation should take about two seconds.

4. Now immediately swing backward, so as to remove the pressure completely.

5. After two seconds swing forward again. Thus repeat deliberately twelve or fifteen times a minute the double movement of compression and release, a complete respiration in four or five seconds.

6. Continue artificial respiration without interruption until natural breathing is restored, if necessary, four hours or longer, or until a physician declares the patient is dead.

7. As soon as this artificial respiration has been started and while it is being continued, an assistant should loosen any tight clothing about patient's neck, chest or waist. KEEP THE PATIENT WARM. Do not give any liquids whatever by mouth until the patient is fully conscious.

8. To avoid strain on the heart when the patient revives, he should be kept lying down and not allowed to stand or sit up. If the doctor has not arrived by the time the patient has revived, patient should be given some stimulant, such as one teaspoonful of aromatic spirits of ammonia in a small glass of water or a hot drink of coffee or tea, etc.

9. Resuscitation should be carried on at the nearest possible point to where the patient received his injuries. He should not be moved from this point until he is breathing normally of his own volition and then moved only in a lying position. Should it be necessary to move the patient before he is breathing normally, resuscitation should be carried on during the time that he is being moved.

10. A brief return of natural respiration is not a certain indication for stopping the resuscitation. Not infrequently the patient, after a temporary recovery of respiration, stops breathing again.

11. In carrying out resuscitation it may be necessary to change the operator. This change must be made without losing the rhythm of respiration.

CAUTION—In removing victim from electric contact protect yourself by using rubber gloves, a newspaper, or woolen cap or garment wrapped on hands. Do not touch person's bare skin with your hands unprotected. The rescuer may take hold of some parts of the clothing, if dry, pulling it off quickly.

Remember that mechanical devices are dangerous in the hands of the inexperienced.

Do not place body in bath unless ordered by doctor.

SHOCK—Present in all serious injuries and greatly increased by severe bleeding and pain. Pale face, cold clammy skin, rapid weak pulse, shallow breathing. Lay patient on back, head low, loosen clothing about neck, chest and abdomen. Keep warm with blankets and hot water bottles, hot bricks or heated stones, being careful not to burn the person. If he can swallow give him hot strong coffee, hot milk or hot water, half teaspoon aromatic spirits of ammonia in water. Never pour liquid down the throat of an unconscious person.

HEMORRHAGE — Bleeding from arteries comes in spurts and is brighter red in color than bleeding from veins. If from large arteries it is always very serious and demands immediate action. Pressure with fingers or hand will usually control it. The points for pressure are (1) just in front of ear for bleeding from temple. (2) Inner side of arm about half way from shoulder to elbow for bleeding from hand or arm. (3) In the groin against pelvis bone for bleeding from foot, thigh or leg. (4) On neck, fingers forward just touching windpipe, thumb around back of neck for cut throat. If necessary a tourniquet can be made by tying a handkerchief or bandage a hand's breadth below the arm pit or groin and twisting till the flow of blood is stopped. LOOSEN EVERY 15 MINUTES. Allow to remain loose if bleeding has stopped, but watch closely and retighten if bleeding commences again. Bleeding from a vein comes in a steady flow. It can be controlled by applying a clean compress or dressing over the wound, bandaging snugly and then applying pressure with the hand directly over the dressing if necessary. Elevating the part aids materially.

OPEN WOUNDS—On scratches and slight wounds apply half strength iodine. Dirty or greasy wounds should first be cleansed with high-grade benzine. Open wounds should be covered with gauze and bandage.

Never wash or touch a wound with fingers, or that part of the gauze that comes in contact with the wound. Never use cobwebs, tobacco, waste or oil. They may cause blood poisoning.

BURNS—On slight burns apply common baking soda in water or petrolatum as a paste; or any good burn ointment, or any clean and non-irritating grease or oil. On severe or deep burns Picric Acid gauze moistened with clean water, or plain gauze moistened with a solution of Picric Acid, 2%; if this is not available, use good burn ointment, but no unclean material.

FRACTURE (Broken Bones)—Handle carefully to prevent sharp ends cutting through flesh. Apply narrow boards, heavy pasteboard, umbrellas, canes, fence railings, or any rigid appliances, as splints for the fractured limbs to permit the patient to be moved without pain or danger. Splints must be padded when applied next to skin, and be long enough to reach beyond the joints above and below fracture.

Three persons are necessary to place an injured person properly on a stretcher, one to lift head and shoulders, another the hips and a third the legs. The stretcher should be placed alongside injured, and helpers should kneel on one knee at the side of patient away from stretcher, lifting him in unison, first to their bended knees, then laying him on stretcher.

EYE INJURIES—Loose particles may be removed from the eyelid with a clean handkerchief, or a bit of a clean cotton rolled on a toothpick, or a match stick. If not easily removed in this way, make no further attempt. Particles embedded in the lid or eye ball should be left to the surgeon. Never violate this rule. Blindness may result. In case of serious eye injury cover with clean cloth compress wrung out in ice cold water and send patient to surgeon or hospital.

SUNSTROKE and HEAT EXHAUSTION—In sunstroke the skin is flushed, hot and very dry; temperature of body is much above normal; pulse is strong and rapid. Cool quickly as possible—especially the head—with cloths wrung out of cold water, ice bags, or a cool bath. Head should be slightly raised. NO stimulants.

In heat exhaustion skin is pale, cold and moist; pulse weak; sweating usually profuse. Often there is vomiting and abdominal cramps. The patient is prostrate. Treatment same as for shock.

FAINTING—Place patient on back with head low, even raising the feet if convenient. Loosen any tight clothing and get plenty of ventilation. Smelling salts, ammonia on a handkerchief, or a little cold water in the face are often helpful. Do not attempt to make the patient drink anything while unconscious. Hot black coffee or aromatic spirits of ammonia—½ teaspoonful well diluted with water—may be given after consciousness returns.

FITS—Do not attempt to hold patient down. Place any small object between teeth to prevent biting tongue. Prevent patient from injuring self, and let sleep after attack.

LIGHTNING—This is a form of electrocution. The treatment is the same as for electric shock.

STINGS of VENOMOUS INSECTS, Etc.—Apply weak ammonia, oil, salt water, or iodine.

FROST BITE TREATMENT—Rubbing with snow is especially bad; frozen tissues are bruised and torn and gangrene is very apt to result. Gently cover the frozen part with the hand or other body surface until the part has thawed and circulation is re-established. If a hand is frozen hold next to the skin in the arm pit or between the thighs. The frozen part may be thawed very gradually in cold water or cool air. If this cannot be done, cover the part with extra clothing until thawed.

SNAKE BITE—Tie ligature or cord around the arm or leg a short distance above the bite. Make a cross-cut clear through the skin over each fang mark. Apply suction with mouth or any other convenient means continuously for at least half-hour. Keep patient lying down, quiet and give treatment previously described for shock. Get doctor.

DOG BITE—Wash wound with running water, apply tincture of iodine, bandage and take to doctor to decide whether to give Pasteur, or Vaccine Treatment to prevent rabies or hydrophobia.

POISONS AND THEIR ANTIDOTES

(Revised by Medical Staff, American Red Cross, Washington, D.C.)

The two MOST important points to be remembered in connection with any poison case in which the individual is conscious are (1) DILUTE; (2) CAUSE VOMITING.

These can both be accomplished at the same time by having the patient immediately drink large quantities of SOAP SUDS, SODA IN WATER, SALT WATER, or even PLAIN WATER. These are all more nauseating if given lukewarm.

The secret of success is to give enough. Start with three or four glasses. If this does not produce results in a few minutes, give some more. Tickling the back of the throat with the finger is also a valuable aid in encouraging vomiting.

This immediate dilution helps to prevent more poison being absorbed into the system, for a diluted poison is not absorbed nearly as rapidly as one in concentrated form. Vomiting is always more easily induced after giving LARGE quantities of fluid.

Services of a physician should always be secured as soon as possible.

Additional information on specific poisons follows:

ALCOHOL—In any form—rum, gin, whisky, proof spirits, etc.; also wood or methyl alcohol.
SYMPTOMS—Giddiness, swaying of body, inability to stand. Face flushed, eyes red. Later, skin clammy, weak pulse, maybe convulsions and unconsciousness.
TREATMENT—Hot coffee or aromatic spirits of ammonia—½ teaspoonful well diluted with water. Do not exhaust by making walk. Wrap warmly and put to bed. In extreme cases, breathing may stop and it will be necessary to give artificial respiration by the prone pressure method.

ARSENIC—Found in rat poison, vermin killer, Paris Green, Fowler's solution. Sometimes in tinned fruits and beer.
SYMPTOMS—Severe pain in stomach; purging; vomiting; severe cramps in legs; dryness of throat; cold sweats; profound shock.
TREATMENT—Be sure that vomiting is repeated until stomach is thoroughly washed out. Castor oil, stimulants of coffee or aromatic spirits of ammonia if needed. Keep warm.

CARBOLIC ACID or PHENOL—Very commonly used in attempts at suicide.
SYMPTOMS—A very powerful corrosive poison. Mouth, lips, throat and often the face burned. Vomiting often produced. In severe cases unconsciousness comes on early and soon death.
TREATMENT—Immediate and repeated washing of the stomach. Soothing liquids, as eggs and milk or milk alone. Stimulants usually needed at once.

CARBON MONOXIDE—Principal danger is from exhaust gases from automobiles and leaky gas pipes. Also found in leaky furnaces and stoves, gas stoves without flue connections, in burning buildings, etc.
SYMPTOMS—Vary considerably depending upon the concentration of the Carbon Monoxide breathed, but the end result is usually a red coloration, especially of ears, lips and nails, and a stopping of breathing.
TREATMENT—1. Remove patient from atmosphere containing carbon monoxide. 2. Start artificial respiration immediately by the Prone Pressure (see page 102) method if breathing has stopped. 3. Administer oxygen as quickly as possible and in as pure form as is obtainable, preferably from an inhalator. A mixing of oxygen 95% and carbon dioxide 5% is usually used in these. 4. Keep the victim flat, quiet and warm. 5. Afterward give plenty of rest.

IODINE—Owing to the now universal use of Tincture of Iodine in the treatment of scratches cuts and wounds, it is found in every household. As a consequence there are cases where children or adults have taken it accidentally or otherwise.
TREATMENT—After vomiting has been induced, give starch or flour mixed with water to about the thickness of buttermilk.

LEAD—Sugar of lead, lead paint, white lead.
SYMPTOMS—Throat dry, metallic taste with much thirst; colic in abdomen; cramps in legs; cold sweat; sometimes paralysis of legs and convulsions.
TREATMENT—After thoroughly emptying the stomach, give ½ oz. Epsom Salts in water. Stimulants if needed and soothing liquids.

MERCURY—Corrosive sublimate, antiseptic tablets or other mercury salts.
SYMPTOMS—Corrosive sublimate when taken is very irritating and frequently turns the mouth, lips and tongue white. Mouth is sometimes swollen and there is a metallic taste. Other symptoms are pain in abdomen, nausea, vomiting mucus and blood, bloody purging, cold, clammy skin, great prostration and convulsions.
TREATMENT—After vomiting has been repeatedly induced, give white of egg, whole beaten eggs, milk or eggs beaten in milk.

NITRATE of SILVER—Lunar caustic.
SYMPTOMS—Pain in mouth and stomach. Mouth first colored white, then black. Vomit first white then black.
TREATMENT—Salt water is the best emetic in this case. If not readily available, give other emetics. Then soothing drinks, as milk or milk and eggs. Stimulants is necessary.

OPIUM—Laudanum, morphine, codeine, heroin, paregoric; some soothing syrups and cough mixtures.
SYMPTOMS—Drowsiness, finally unconsciousness. Pulse full at first, then weak. Breathing full and slow at first, gradually slower and shallower. Pinpoint pupils. Face flushed, then purple.
TREATMENT—You may have difficulty getting emetic to work. Plenty of strong coffee. Try to arouse by speaking loudly and threatening, but do not exhaust by compelling to walk, etc. Stimulants and artificial respiration if breathing stops.

PHOSPHORUS—In many rat poisons and vermin killers: often with arsenic.
SYMPTOMS—Severe pain in stomach; vomiting. Bleeding from nose, blooding, purging, convulsions.
TREATMENT—After vomiting, a half ounce of Epsom Salts in water or magnesia. Stimulants. Soothing liquids as milk, but avoid fats and oils.

PTOMAINE (Food Poisoning)—Poisoning by decayed or spoiled food. Chicken, fish and potatoes are some of the worst offenders.
SYMPTOMS—Nausea, vomiting, purging. Severe pain in abdomen, cramps, great prostration and weakness. Skin cold and clammy. Often an eruption on the skin.
TREATMENT—After emetic give purgative of castor oil or Epsom Salts. If very weak a stimulant of hot coffee or ½ teaspoonful of Aromatic Spirits of Ammonia well diluted with water.

POISON MUSHROOMS or TOADSTOOLS.
SYMPTOMS—Vomiting, purging, watery diarrhea. Discharges sometimes accompanied by blood. Pulse slow and strong at first, but later grows very weak. Saliva and sweat pour out.
TREATMENT—Same as food poisoning.

STRYCHNINE or NUX VOMICA—Often taken accidentally by small children who find "candy" pills or tablets left for some adult member of the family. Also strychnine is frequently used on meat to poison animals and in some vermin killers.
SYMPTOMS—First twitching of the hands and feet followed by convulsions. Affects all muscles of body. Back is often bowed up by spasms of muscles. Jaws are locked. Spasms of muscles so great that breathing is prevented and face becomes dusky.
TREATMENT—After vomiting is induced powdered charcoal may be given. Repeat emetic.

VERONAL-LUMINAL, ETC.
SYMPTOMS—Patient becomes very drowsy then falls asleep. In very severe cases the sleep is so deep that the patient cannot be aroused.
TREATMENT—Same as for Opium.

CORROSIVE ACIDS—(1) Acetic, (2) nitric, (3) hydrochloric, (4) sulphuric, (5) also such weaker acids as oxalic.
SYMPTOMS—Very severe burning pain in mouth, throat and stomach. Wherever the stronger acids touch the skin or mucous membranes, they are destroyed. Frequently vomiting or purging. More or less suffocation from swelling of the throat, great prostration and shock.
TREATMENT—Large quantities of soap suds make the best emetic in these cases. However, any of the previously mentioned emetics will do. After vomiting is induced give soothing liquids, as milk, eggs and milk or olive oil. Stimulants are usually required. Aromatic Spirits of Ammonia quite suitable here.

CAUSTIC ALKALIES—(1) Ammonia, strong ammonia liniment; (2) lime, quicklime; (3) potash, caustic potash; (4) soda, caustic soda.
SYMPTOMS—Much like corrosive acids. Immediate severe burning pain in mouth, throat and stomach. Vomiting and purging.
TREATMENT—Induce vomiting by giving large quantities of one of the previously mentioned emetics, then give soothing liquids and stimulants if needed.

HELPFUL HOUSEHOLD HINTS

Applying kerosene with a rag when you are about to put your stoves away for the summer will prevent them from rusting.

Charcoal is recommended as an absorber of gases in the milkroom where foul gases are present. It should be freshly powdered and kept there continually.

A teaspoonful of borax put into the last water in which clothes are rinsed will whiten them surprisingly. Pound the borax so it will dissolve easily.

One teaspoonful of ammonia to a teacupful of water applied with a rag will clean silver or gold jewelry.

Clear boiling water will remove tea stains. Pour the water through the stain to prevent spreading.

Salt will curdle new milk; in making porridge, gravies, etc., salt should not be added until the dish is prepared.

Paint stains that are dry and old may be removed from cotton or woolen goods with chloroform. First cover the spot with olive oil or butter.

Distilled water and soap will remove machine grease from washable fabrics.

Boiling starch is much improved by the addition of sperm or salt, or both, or a little gum arabic dissolved.

Milk which has changed may be rendered fit for use again by stirring in a little soda.

Fish may be scaled easily by first dipping them into boiling water for a minute.

Kerosene will soften boots and shoes that have been hardened by water, and render them pliable.

A teaspoonful of turpentine boiled with your white clothes will aid the whitening process.

A little quicklime placed in the infested places will drive away any kind of ants.

To make leather waterproof, saturate it with castor oil. To stop shoes from squeaking drive a peg in center of sole.

To wash colored calicos dissolve 10 cents worth of sugar of lead in 3 to 4 quarts water (rain water is best). After the garments are washed and rinsed let them be dipped in and wrung out. It sets the color and keeps it.

A good cement for glass is made by dissolving an ounce of isinglass in two wineglasses of spirits.

To remove clinkers from stove or fire-place put in about a peck of oyster shells on top of a bright fire. This may need repeating.

To remove mildew from cloth put a teaspoonful of chloride of lime into a quart of water, strain it twice, them dip the mildewed places in this weak solution. Lay them in the sun. If the mildew has not disappeared when dry, repeat.

To get rid of moths sprinkle furniture and cushions thoroughly with benzine. It will not spot or injure the most delicate fabric, but it is sure death to moths. The work must be done in a place where there is neither a fire nor a lighted lamp, for benzine is very explosive.

To restore a fabric's original color when the color of a fabric has been destroyed by an acid, ammonia is applied to neutralize the acid, after which an application of chloroform will in most cases restore the original color.

To remove a rusty screw apply red hot iron to the head for a short time, the screwdriver being applied immediately while the screw is hot.

To raise the pile on velvet cover a hot iron with a wet cloth, and hold the velvet over it. Brush it quickly while damp.

To remove tar from cloth rub well with turpentine and every trace of tar will be removed.

To set the color in lawn dissolve a half pound of saltpeter in a pailful of water and dip the lawn in it several times before washing.

To remove egg stains from spoons rub with common salt.

To remove stains of fruits from the hands wash your hands in clear water, dry slightly, and while yet moist strike a sulphur match and hold your hands around the flame. The stains will immediately disappear.

To clean furniture rub with cotton waste, dipped in boiled linseed oil Then rub clean and dry with a soft flannel.

To restore gilt frames rub with a sponge moistened with turpentine.

To clean marble take 2 parts of common soda, 1 part of pumice stone and 1 part of finely powdered chalk. Sift it through a fine sieve and mix it with water. Then rub it well all over the marble and the stains will be removed. Wash with salt and water.

To remove oil or grease spots from carpets lay a piece of blotting paper over the spot and set a flatiron on top, the iron just hot enough not to scorch. Change the paper as often as it becomes greasy. After most of the oil has been extracted apply whiting. Leave it on for a day or two, then brush off, and the spot will have disappeared.

To remove stains or grease from oil paint use bisulphide of carbon, spirits of turpentine; or, if dry and old use chloroform. These and tar spots can be softened with oilve oil and lard.

Hot water, ammonia and a little washing powder will clean an oil mop very successfully after water and soap have failed.

To remove grease from silks take a lump of magnesia, rub it wet on the spot, let it dry; then brush off the powder.

Iron rust may be removed from white goods by sour milk.

To remove oil marks on wall paper apply paste of cold water and pipe clay. Leave it on all night, brush off in the morning.

To remove paint spots from clothing saturate with equal parts turpentine and spirits of ammonia.

To cleanse house paper rub with a flannel cloth dipped in oatmeal.

Powdered borax when scattered around will cause ants to disappear.

A little turpentine upon a fever blister will keep it from making a sore.

To touch the point of a boil with carbolic acid will frequently cause it to leave.

Equal parts of lime water and raw linseed oil well shaken make an excellent application for severe burns.

Onions should always be boiled in water that has been salted, otherwise they lose much of their flavor.

To remove the skins from tomatoes, rub them all over with the back of a knife to loosen the skins before peeling. This is better than scalding them.

The best duster for velvet or plush furniture is a piece of clean chamois leather, wrung out of cold water.

To keep irons bright and shining, give them a few strokes while hot over a piece of paper covered with a handful of salt.

To keep a raw yolk of egg from drying up, cover with a bit of water.

Keep corks in sewing box to stick on sharp points or crochet needles, bodkins and scissors.

Don't forget to check the sewing machine once in a while. Go over loose parts with a clean cloth and brush. Oil with sewing machine oil. Keep machine covered when not in use.

A ready mouth wash or gargle—dissolve in one pint of boiling water, one level teaspoon salt. When cool, bottle and place on the medicine shelf.

Honey is a desirable sweetening for the food of invalids, infants, and the aged, says the U.S. Department of Agriculture. It is one of the quickest-acting of all foods, since it does not have to be broken down into simpler substances before being utilized, as is the case with most foods. The two simple sugars which compose honey dextrose and levulose can be absorbed directly into the blood stream and made available for energy.

To give a creamy or ecru tint to old lace wash and dip in hot coffee then rinse in warm water.

To clean black kid gloves put a few drops of black ink in a tablespoon of salad oil, rub on gloves and dry.

To retain the glossy finish on sateen and other cotton materials with a glossy finish, add a little borax to the rinse water when washing.

To give uniform coat of sugar to doughnuts, put ¼ cup sugar in a paper sack, drop in a few hot doughnuts, tighten the sack and shake it.

Dip the food chopper in hot water to prevent raisins sticking.

Cover a cookie with a layer of thick whipped cream and nuts, add another cookie. Result: a quick and appetizing dessert.

LIFE, SERVICE AND COST OF SERVICE OF FARM MACHINERY

Machine	Average life in years	Annual depreciation and 7 percent interest	Annual cost of repairs	Annual cost of housing and insurance	Total annual cost	Average Annual service days
		Pct.	Pct.	Pct.	Pct.	
Corn binder	14	11.43	1	2	14.4	6
Corn picker	10	14.2	1	2	17.2	15
Corn planter	15	11.0	1	2	13.98	6
Corn sheller, 1-hole	18	9.9	1	2	12.9	12
Corn sheller, 2-hole	18	9.9	1	2	12.9	12
Cultivator,						
1-horse	15	11.0	5	2	18.0	17
1-row	15	11.0	5	2	18.0	20
2-row	15	11.0	3	2	16.0	16
Ensilage cutter	10	14.2	1.5	2	17.5	7
Feed grinder	15	11.0	1.5	2	14.5	18
Gas engine, 2-hp.	15	11.0	1	2	14.0	80
Grain binder	16	10.6	1	2	13.6	6
Grain drill	18	9.9	.5	2	12.4	6
Harrow,						
Disk	15	11.0	2	2	15.0	13
Smoothing	20	9.4	1.5	2	12.9	11
Spring tooth	8	16.8	.5	2	19.3	10
Hay loader	20	9.4	1	2	12.4	8
Hay rake,						
Dump	20	9.4	1	2	12.4	6
Side delivery	16	10.6	1	2	13.6	6
Sweep	14	11.4	1	2	14.4	6
Hay stacker,						
Swinging	14	11.4	1	2	14.4	6
Manure spreader	14	11.4	1.5	2	14.9	25
Mower	15	11.0	2.5	2	15.5	6
Plow,						
Walking 14"	14	11.4	4	2	17.4	6
Sulky	16	10.6	4	2	16.6	14
Gang 24"	15	11.0	3	2	16.0	16
Tractor 2	9	15.4	3	2	20.4	16
Tractor 3	9	15.4	3	2	23.4	16
Roller	16	10.6	0.5	2	13.1	7
Seeder,						
Broadcast	16	10.6	0.5	2	13.1	4
Endgate	16	10.6	0.5	2	13.1	4
Threshing machine	15	11.0	2	2	15.0	16
Tractor, 10-20	8	16.8	2	2	20.8	35
Wagon	24	9.4	2	2	13.4	80

HEIGHT AND WEIGHT TABLES

HEIGHT AND WEIGHT TABLE FOR GIRLS

Height in	AGE YEARS 5	6	7	8	9	10	11	12	13	14	15	16	17	18
39	34	35	36											
40	36	37	38											
41	38	39	40											
42	40	41	42	43										
43	42	42	43	44										
44	44	45	45	46										
45	46	47	47	48	49									
46	48	48	49	50	51									
47	..	49	50	51	52	53								
48	..	51	52	53	54	55	56							
49	..	53	54	55	56	57	58							
50	..	..	56	57	58	59	60	61						
51	..	..	59	60	61	62	63	64						
52	..	..	62	63	64	65	66	67						
53	..	..	..	66	67	68	68	69	70					
54	..	..	..	68	69	70	71	72	73					
55	..	..	..	..	72	73	74	75	76	77				
56	..	..	..	..	76	77	78	79	80	81				
57	..	..	..	..	..	81	82	83	84	85	86			
58	..	..	..	..	..	85	86	87	88	89	90	91		
59	..	..	..	..	..	89	90	91	93	94	95	96	98	
60	..	..	..	..	..	..	94	95	97	99	100	102	104	106
61	..	..	..	..	..	..	99	101	102	104	106	108	109	111
62	..	..	..	..	..	..	104	106	107	109	111	113	114	115
63	..	..	..	..	..	..	109	111	112	113	115	117	118	119
64	..	..	..	..	..	..	..	115	117	118	119	120	121	122
65	..	..	..	..	..	..	..	117	119	120	122	123	124	125
66	..	..	..	..	..	..	..	119	121	122	124	126	127	128
67	..	..	..	..	..	..	..	..	124	126	127	128	129	130
68	..	..	..	..	..	..	..	..	126	128	130	132	133	134
69	..	..	..	..	..	..	..	..	129	131	133	135	136	137
70	..	..	..	..	..	..	..	..	..	134	136	138	139	140
71	..	..	..	..	..	..	..	..	..	138	140	142	143	144
72	..	..	..	..	..	..	..	..	..	..	145	147	148	149

HEIGHT AND WEIGHT TABLE FOR BOYS

Height in	AGE YEARS 5	6	7	8	9	10	11	12	13	14	15	16	17	18
39	35	36	37											
40	37	38	39											
41	39	40	41											
42	41	42	43	44										
43	43	44	45	46										
44	45	46	46	47										
45	47	47	48	48	49									
46	48	49	50	50	51									
47	..	51	52	52	53	54								
48	..	53	54	55	55	56	57							
49	..	55	56	57	58	58	59							
50	..	..	58	59	60	60	61	62						
51	..	..	60	61	62	63	64	65						
52	..	..	62	63	64	65	67	68						
53	..	..	..	66	67	68	69	70	71					
54	..	..	..	69	70	71	72	73	74					
55	..	..	..	..	73	74	75	76	77	78				
56	..	..	..	..	77	78	79	80	81	82				
57	..	..	..	..	..	81	82	83	84	85	86			
58	..	..	..	..	..	84	85	86	87	88	90	91		
59	..	..	..	..	..	87	88	89	90	92	94	96	97	
60	..	..	..	..	..	91	92	93	94	97	99	101	102	
61	..	..	..	..	..	..	95	97	99	102	104	106	108	110
62	..	..	..	..	..	..	100	102	104	106	109	111	113	116
63	..	..	..	..	..	..	105	107	109	111	114	115	117	119
64	..	..	..	..	..	..	..	113	115	117	118	119	120	122
65	..	..	..	..	..	..	..	..	120	122	123	124	125	126
66	..	..	..	..	..	..	..	..	125	126	127	128	129	130
67	..	..	..	..	..	..	..	..	130	131	132	133	134	135
68	..	..	..	..	..	..	..	..	134	135	136	137	138	139
69	..	..	..	..	..	..	..	..	138	139	140	141	142	143
70	..	..	..	..	..	..	..	..	..	142	144	145	146	147
71	..	..	..	..	..	..	..	..	..	147	149	150	151	152
72	..	..	..	..	..	..	..	..	..	152	154	155	156	157

HEIGHT AND WEIGHT TABLES FOR MEN AND WOMEN

AGE Group	MEN Hgt. 5′	Hgt. 5′1″	Hgt. 5′2″	Hgt. 5′3″	Hgt. 5′4″	Hgt. 5′5″	Hgt. 5′6″	Hgt. 5′7″	WOMEN Hgt. 4′11″	Hgt. 5′	Hgt. 5′1″	Hgt. 5′2″	Hgt. 5′3″	Hgt. 5′4″	Hgt. 5′5″
	Wgt.	Wgt.	Wgt.	Wgt.	Wgt.	Wgt.	Wgt.	Wgt.	Wht.	Wgt.	Wgt.	Wgt.	Wgt.	Wgt.	Wgt.
15–19	113	115	118	121	124	128	132	136	110	112	114	117	120	123	126
20–24	119	121	124	127	131	135	139	142	113	115	117	120	123	126	129
25–29	124	126	128	131	134	138	142	146	116	118	120	122	125	129	132
30–34	127	129	131	134	137	141	145	149	119	121	123	125	128	132	136
35–39	129	131	133	136	140	144	148	152	122	124	126	129	132	136	140
40–44	132	134	136	139	142	146	150	154	126	128	130	133	136	139	143
45–49	134	136	138	141	144	148	152	156	129	131	133	136	139	142	146
50–54	135	137	139	142	145	149	153	157	131	133	135	138	141	144	148
	5′8″	5′9″	5′10″	5′11″	6′	6′1″	6′2″	6′3″	5′6″	5′7″	5′8″	5′9″	5′10″	5′11″	6′
15–19	140	144	148	153	158	163	168	173	130	134	138	141	145	150	155
20–24	146	150	154	158	163	168	173	178	133	137	141	145	149	153	157
25–29	150	154	158	163	169	175	181	187	136	140	144	148	152	155	159
30–34	154	158	163	168	174	180	186	192	140	144	148	152	155	158	162
35–39	157	162	167	172	178	184	191	197	144	148	152	156	159	162	165
40–44	159	164	169	175	181	187	194	201	147	151	155	159	162	166	169
45–49	161	166	171	177	183	190	197	204	151	157	162	166	170	170	173
50–54	162	167	172	178	184	191	198	205	152	157	162	166	170	174	177

HELPFUL PAINTING IDEAS

Rub vaseline or cold cream into the hands before painting.

Glossy enamel dries dull if a little enamel undercoater is mixed with the last coat.

A good cleaner: equal parts white vinegar kerosene and water.

Mark off the basement floor in squares and paint with two colors of paint for tile effect.

A bowl of water placed in a newly-painted room will help eliminate the odor.

A tin shield 12″ long will protect walls when washing or wiping woodwork.

Rub with powdered pumice stone, oil and soft rag to make a glossy varnish dull.

A high room looks lower with a mold dropped on the walls 16″ to 24″ from the ceiling.

A narrow room appears wider with a chair rail or plate rail effect.

Birch, whitewood or poplar, gumwood and white pine are best for enamel finishes.

Never use a water stain on soft woods; use an oil stain or penetrating spirit stain.

DAILY DIET REQUIREMENTS OF A CHILD

1. Milk—One quart.
2. Vegetables—three, one of which may be potatoes. One should be green or raw. Tomatoes should be served once or twice a week.
3. Fruits—Two, one preferably raw. Oranges should be included at least once or twice a week.
4. Meat—Or a meat substitute, as fish, eggs, cheese or dried peas or beans, one or two servings daily.
5. Whole Grain Products—At least one serving daily.
6. Water—Four glasses daily for the average child, one glass immediately upon arising.

Too many children go to school with little or no breakfast. This is the most important meal of the day for the child who is inclined to be underweight, who tires easily, or who uses up a great deal of energy

There are numerous ways in which unthinking adults can begin a child's prejudice for a specific food, or can lay the foundation for a habit of refusing to eat or dawdling at meals. If the mother or father expresses a dislike for a food or refuses to eat it in the presence of a child, the child naturally decides he does not like the food either, hence difficulties arise.

If children are given their meals at a separate table, there will be fewer disturbing influences to take their thoughts from the business of eating, and no comparisons will be made between the food which their parents are eating and that which they themselves have been served.

Parents see a new responsibility when assured that likes and dislikes are not inherited but are developed in early childhood, aided by example, suggestion and other adult influences. After all, the knowledge that children arrive in this world without habits, good or bad, is a challenge to parents.

COMPARATIVE VALUES OF FOODS

Apple	contains 85% water, 8% sugar, 0.22% proteids, 1.04% acids
Barley	contains 14% water, 66% starch, 11.18% proteids, 2.12% sugar, 5% fibrin
Banana	contains 74% water, 23% carbohydrates, 1.0% salts, 1.1% proteids
Beans (Navy)	contains 15% water, 55% carbohydrates, 24% proteids, 1.6% fat, 3.10% salts
Beef, Fresh	contains 67% water, 12% fat, 16% proteids, 3.02% nitrogen, 0.96% ash
Bread	contains 35% water, 45% starch, 3% sugar, 4% fat, 10% proteids, 3% salts
Butter	contains 14% water, 84% fat, 0.66% salts, 0.50% milk, 0.75% casein
Carrots	contains 83% water, 14% carbohydrates, 1.3% proteids, 0.2% fat, 1% salts
Cheese (Am.)	contains 39% water, 30% fat, 24% casein, 2.03% sugar, 4.07% ash
Chicken	contains 73% water, 21% proteids, 2% sugar, 1% fat
Chocolate	contains 11% water, 46% fat, 12% proteids, 27% carbohydrates, 3% salts
Codfish	contains 82% water, 16% proteids, 0.40% fat, 1.20% ash
Eggs, White	contains 86% water, 13% proteids, 0.25% fat, 0.59% salts
Eggs, Yolk	contains 51% water, 16% proteids, 32% fat, 1% salts
Grapes	contains 80% water, 14% sugar, 0.22% proteids, 1.32% acids, 1.49% pectose
Ham (lean)	contains 60% water, 24% proteids, 15% fat, 1% ash
Milk (cow's)	contains 86% water, 4% sugar, 4% fat, 3% proteids, 3% casein
Oats	contains 13% water, 53% starch, 6% fat, 12% proteids, 2.32% sugar, 11% fibrin
Oatmeal	contains 7% water, 58% starch, 6% fat, 8% proteids, 5% sugar, 3% salts
Potatoes	contains 75% water, 18% starch, 3% sugar, 2% proteids, 0.2% fat, 0.7% salts
Rice	contains 14% water, 78% starch, 6% proteids, 0.7% fat, 0.4% sugar, 0.5% salts
Salmon	contains 65% water, 20% proteids, 13% fat, 1.48% ash
Sugar Loaf	contains 5% water, 91% sugar, 2.40% glucose, 0.80% organic, 0.30% ash
Tomatoes	contains 85% water, 2.5% carbohydrates, 0.8% proteids, 0.4% fat, 0.80% salts
Wheat	contains 14% water, 18% proteids, 18% fat, 1% ash
Veal	contains 63% water, 6.6% starch, 12% proteids, 2% fat, 1.50% sugar, 3% fibrin

NOTE—Figures given are based upon 100%. Where the percentages do not make a total of 100 the unimportant deficiency is composed of waste materials. All percentages are average.

REFERENCE—The most important food elements are as follows:

NITROGENOUS COMPOUNDS—Albumen, Casein, Fibrin, and Gluten—contained in lean meats, eggs, fish, milk, etc., also classed as PROTEID OR ALBUMINOUS substances are needed for the formation of muscles and other tissues of the human body. CARBON, OXYGEN and HYDROGEN, the CARBON COMPOUNDS, are divided into HYDRO-CARBONS, the fats which are burned in the body, yielding heat, vital forces, etc., and CARBOHYDRATES, the fat producers, which include sugars, starch, gums, dextrin, etc., containing less carbon, but Hydrogen and Oxygen in right proportion to produce water. ASH, the MINERAL ELEMENTS, as Salts, Lime, Phosphorus, Sulphur, etc., supplied especially by vegetables are required for the bones, blood, nerves, etc.

INSURANCE RECORDS

Date	Issue	Name of Company	Policy No.	Amount	Premium	Expires

AUTO TIRE RECORD

Date put on	WHEEL	Speedometer Mileage when put on	Date taken off	Speedometer Mileage when removed	TOTAL MILEAGE	MAKE

ADDRESSES OF TRUCK CUSTOMERS

NAME	ADDRESS	CUSTOMER FOR

MEMORANDA

CALENDAR

1937

JANUARY

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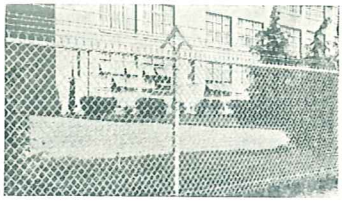
Pittsburgh Products

Pittsburgh Chain Link Fences

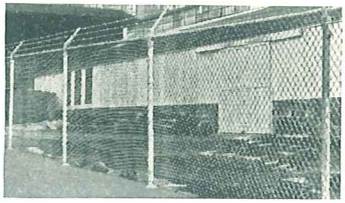
Pittsburgh Steel Company is an important factor in the field of quality Industrial, Institutional and Estate fences as well as in the Farm and Home fence markets. Made of the same basic open hearth copper-bearing quality steel that features all Pittsburgh Fences, and provided with an exceptionally complete and well-designed line of fittings and accessories, Pittsburgh Chain Link Fences have well earned the favor of users the Country over. All Pittsburgh Chain Link Fences are available in a wide range of weights and heights—either erected or not as you choose. Erection service is available everywhere. Stainless Steel Chain Link Fences are also available.



Pittsburgh Chieftain

(5 barbed wire top)

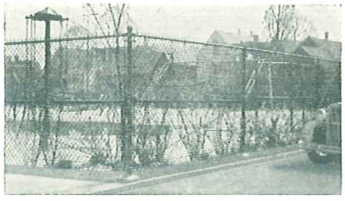
Chain Link Fence; for heavy duty industrial and institutional service.



Pittsburgh Custodian

(3 barbed wire top)

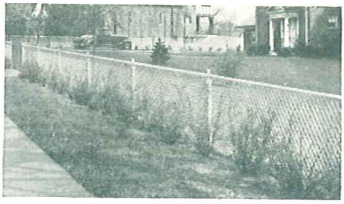
Chain Link Fence; like Chieftain fence except for the difference in tops.



Pittsburgh Guardian

(No barbed wire top)

Chain Link Fence; for service where barbed wire protection is not needed.

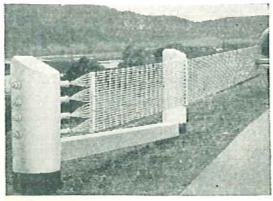


Pittsburgh Residential

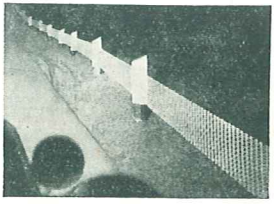
Chain Link Fence; for residential enclosures of the finer type.

Pittsburgh Safety Highway Guard

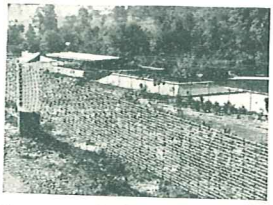
Pittsburgh Safety Highway Guard is a comparatively new product, but its very real advantages of resilient strength and high visibility have already dictated its choice for many of the Country's major highway projects, both as new guard and as replacement for old material of other types. Pittsburgh Safety Highway Tape (3" wide) is also available for use where 14" Guard may not be thought necessary.



The high visibility of this 14" wide woven steel band, galvanized and painted white, is quite as important a factor in accident prevention as its resilient spring steel strength is in minimizing accident damage.



The strength and resiliency of Pittsburgh Safety Highway Guard are such that cars striking it at ordinary speeds are often deflected at the bumper without damage either to car or Guard.

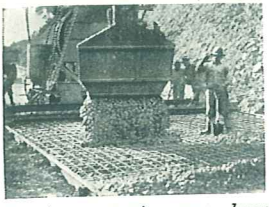


Close-up of Pittsburgh Safety Highway Guard, struck by a car's bumper at an angle of about 75°. The car was deflected without so much as a body scratch. The Guard can be easily straightened.

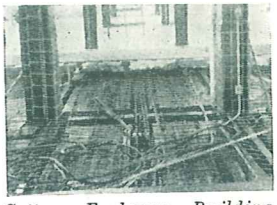
Pittsburgh Products

Pittsburgh Reinforcing

Welded steel wire reinforcing has such definite advantages of efficiency and convenience in much construction work that its use, although still most common in highway and building construction, has so spread as to make the importance of Pittsburgh Reinforcing in all branches of concrete work hard to overestimate. In everything from skyscrapers to concrete pipe it is doing its job long and well.



Pouring concrete over heavy welded-joint Pittsburgh Reinforcing as a means of crack control on modern U.S. Highway 51.



Cotton Exchange Building, Houston, Texas. Pittsburgh Reinforcing is used here for floor slabs and column wrapping.

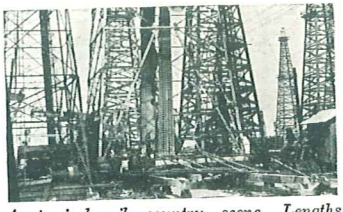
Lining a reservoir with Gunite (a mixture containing sand and cement, applied with a cement gun) over Pittsburgh Reinforcing.

Pittsburgh Seamless

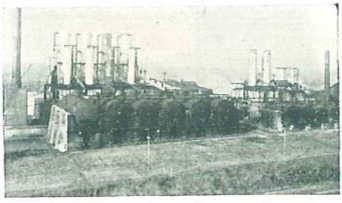
STEEL PIPE AND TUBES

Pittsburgh Seamless Steel Drill Pipe, Casing and Tubing have long been famous for quality in the oil fields, where a drill stem or casing failure is costly business. Several successive world's records for deep well drilling have been made with Pittsburgh Seamless. Incidentally, "Pittsburgh" has recently developed a new special double-grip-joint drill pipe which overcomes many of the previous difficulties of deep well drilling.

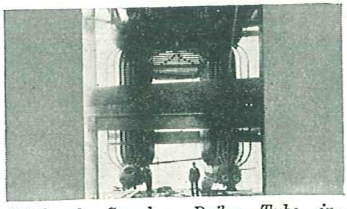
In the field of Power—both stationary and motive—*Pittsburgh Seamless Boiler Tubes* are being used in all kinds of important installations throughout industry. Refining and Refrigeration present still other types of heavy-service piping difficulties which *Pittsburgh Seamless Pressure Piping* has successfully overcome. And, finally, *Pittsburgh Seamless Mechanical Tubing* is very likely to be present, either in one or more vital parts both of your automobile and of the airplane in which you last rode, or as an important part of the precision equipment used in the manufacture of each.



A typical oil country scene. Lengths of Pittsburgh Seamless Drill Pipe in the derrick; Pittsburgh Seamless Casing in the well — both as insurance against costly failures.



The intense, sudden stresses in everyday refinery operations make Pittsburgh Seamless quality mean much to operators who have to have dependability to run their plants at all.

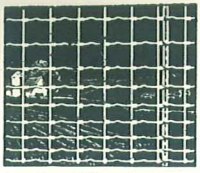


Pittsburgh Seamless Boiler Tube installation for Kip's Bay Station of the New York Steam Corporation. Nothing but highest quality tubes would ever do for such an important job as this.

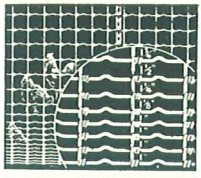
This view inside a Pittsburgh Seamless distributor's stockroom indicates something of the wide variety of sizes and wall thicknesses of Pittsburgh Seamless steel tubular products.

Pittsburgh Products

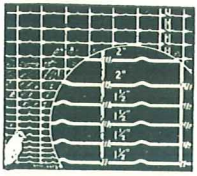
Pittsburgh
HINGE-JOINT FENCES



Pittsburgh Hinge-Joint Farm Fences are made in all standard heights, weights and styles to provide fabrics for every individual fencing need.

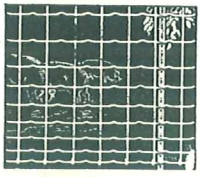


Pittsburgh "Chictite" Hinge-Joint Poultry Fences — the first fences ever made with line-wire spacing graduating upward from 1" for combined efficiency and economy.

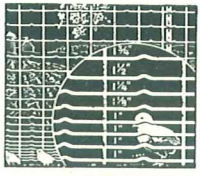


Pittsburgh Hinge-Joint Poultry and Garden Fences—very much like Pittsburgh Chictite fences except that line-wires are spaced slightly wider apart.

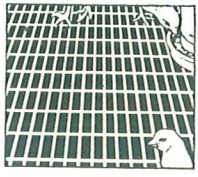
Pittsburgh
STIFF-STAY (WELDED-JOINT) FENCES



Pittsburgh Stiff-Stay Fences are also made in all standard farm styles, heights and weights. No extra charge for the welded joints.

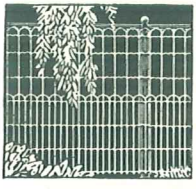


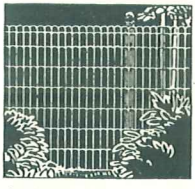
Pittsburgh Stiff-Stay Poultry Fences are the welded stiff-stay equivalents of hinge-joint Poultry and Garden and Chictite Fences.

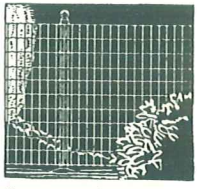


Pittsburgh Special Welded Fences include several styles of Fur Farming Fences and the welded-joint Poultry Fabrics described in Part 5.

Pittsburgh
WELDED LAWN FENCES

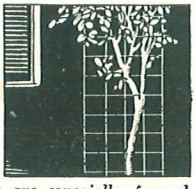






The complete line of welded Pittsburgh Lawn Fences includes, in addition to a full range of styles in the design types illustrated here, a special close-mesh plain design often used for many of the other-than-fence purposes outlined in Part 6. This is the famous "Pittsburgh" line of modern lawn fences whose exceptional strength and neat, lasting good looks have given such impetus to the new Fence Garden idea (see page 78) in home landscaping. They are all available either as fabric alone or as Complete Fence, with Posts, Gates and Fittings to match. Ask your dealer.

Pittsburgh
FLOWER FENCES AND TRELLIS

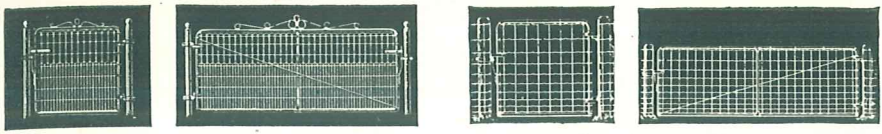


These welded fence fabrics are especially favored by home gardeners because they are so easily handled. The Flower Fence needs only to be pushed into the ground. The Trellis is easily cut or shaped. Neither will ravel.

Pittsburgh Products

Pittsburgh

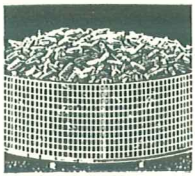
LAWN AND FARM GATES



Pittsburgh Gates are made in many heights and widths to match all Pittsburgh Fences. The designs shown are the regular ornamental and plain lawn and farm styles. Special poultry and tilting-frame gates are also available.

Pittsburgh

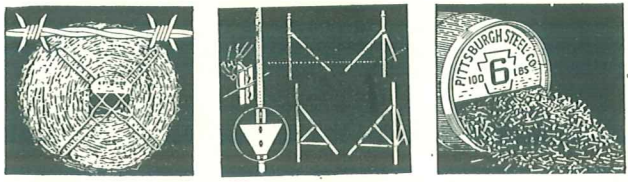
CORN CRIBS



Made of regular Pittsburgh Welded Wire Fabric, No. 12½ gauge. Available in 4 styles, each having 400 bushels capacity.

Pittsburgh

WIRE, NAILS, POSTS AND FENCE FITTINGS



Pittsburgh Barbed and Plain Wires, Fence Posts, Fence Tools and Fittings, Nails and Staples are all products of interest to everyone at some time or other. All are made in a wide variety of styles and designs to provide a complete line of quality merchandise identifiable under one responsible brand name.

The Pittsburgh Products briefly illustrated and described on these pages are all made to the rigid, high standards of quality that have characterized the products of this Company since its founding more than thirty-five years ago. No attempt has been made here either to catalogue these products item by item or to describe any of them in detail. Complete descriptive catalogues and circulars are available free, either from your dealer or upon direct request addressed to us. Meanwhile we suggest, if you are interested in any of the specific products mentioned here or elsewhere in this Book, that you ask your dealer to show you what you want. You will be under no obligation, and you may well find it to your advantage to investigate. Pittsburgh Products are no higher in price than other standard merchandise.

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